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DIVERTICULITIS OF THE SIGMOID COLON*

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"SAN MICHELE", the story of Axel Munthe, popularized "colitis", and we still too often find any disturbance of function of the large bowel so labelled. Functional disturbance of the colon without a demonstrable organic lesion confronts the family physician most frequently. Organic disease of this organ, however, occurs with sufficient frequency to warrant a careful study of the various clinical entities. An analysis of the signs and symptoms, combined with the physical aids to diagnosis, makes possible a conclusion which determines rational therapy, and thus saves the patient from disaster.

The possibility of cancer as a cause of functional disturbance of the colon must be constantly in the foreground during the consideration of any such problem. The youth of the patient is no barrier to carcinoma. In 2 cases seen in consultation the age of the patients was 27 and 34 years. The constant distress in the right iliac fossa experienced by one of these patients, caused by a distended cæcum secondary to a stenosing carcinoma of the sigmoid colon, resulted in the removal of the appendix without further investigation. Thus disastrous delay and an unnecessary operation preceded correct diagnosis and adequate treatment.

Patients who suffer from lesions of the colon will seek relief for only two reasons: first, a change in the rate of flow of content, *i.e.*, either constipation or diarrhœa; second, a change in the character of the content, *i.e.*, increase or decrease of fluid, the presence of blood, mucus or pus. Yet how frequently we fail to consider the more minor departures from normal physiological function as indicating a possible serious organic lesion; how rarely is an alteration in the rate of flow and character of the content sufficient to stimulate us to make a microscopic examination of the stool.

The present study was undertaken with the hope that an analysis of a personal series of cases of diverticulitis of the sigmoid colon might help us to diagnose and efficiently treat such patients. The basis of our remarks is an analysis of 44 cases which had progressed to a point where surgical consultation was necessary. This must represent but a very small cross-section of the total cases of diverticulitis. The high morbidity and mortality of this group causes us grave concern. We must attempt to determine whether it would have been possible earlier in the disease to have carried out treatment which would have proven more effective.

The condition described as diverticulosis must of necessity precede diverticulitis. Without entering into a discussion of the etiology of diverticulosis, we shall simply state that it is the result of multiple herniæ of the mucous membrane of the sigmoid through the muscle coat. Thus each diverticulum consists of mucous membrane covered by peritoneum. Such diverticula are present without symptoms or any clinical evidence of their presence in approximately 5 per cent of persons subjected to a routine x-ray examination of the colon for any cause. Of this 5 per cent, approximately 12 to 15 per cent develop diverticulitis. To translate this into the incidence occurring in a family practice, we grant that one thousand patients constitute a practice; we grant that 250 will be over forty years of age; 12 of these will have diverticulosis, and at least 1 will have diverticulitis. Diverticulosis is rare under thirty-five years of age, and we had only 3 cases of diverticulitis between thirty-five and forty years of

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age. When one considers that in a family practice there is on the average only one case of duodenal ulcer under active treatment, we realize that from the general practitioner's viewpoint, his problem with sigmoid diverticulitis should be as great as with duodenal ulcer, and yet the interest and discussion of these two disease processes show a great disparity.

A simple and practical classification is as follows:—

A. Diverticulosis
B. Diverticulitis
  I. *Acute*
    (*a*) Involving single diverticulum
    (*b*) Non-perforating
    (*c*) Perforated
  II. *Chronic*
    (*a*) Non-perforating
      (1) Peri-sigmoid adhesions and obstruction
    (*b*) Chronic slow perforation
      (1) Peri-sigmoid abscess
      (2) Into mesentery
      (3) Into adjacent viscera (bladder)

It becomes obvious that we have two definite clinical groups, the acute and the chronic. It does not necessarily follow, however, that the chronic phase of the disease is always preceded by the acute phase. The realization, therefore, that an acute diverticulitis may be responsible for an acute intra-peritoneal tragedy becomes of great importance.

In this group there were 11 cases in which an acute perforation occurred, with symptoms so alarming that an emergency operation was necessary. Four of these patients died. In only one case, in which death was due to a pulmonary embolus, was the treatment beyond question. The second patient died because of an error in surgical judgment. The area involved, containing the perforation, was dealt with by the exteriorizing Mickulicz operation. We believe that the error was in carrying out a too major procedure for this lesion, and one which subsequent experience has shown is unnecessary. The third patient ultimately died from carcinoma, which was the etiological factor producing the diverticulitis. This patient had been treated for suddenly-developing idiopathic constipation over a period of six months prior to the perforation, without any serious attempt or adequate investigation to determine if there might be an organic cause. The fourth case was seen four years previous to the perforation during the sub-acute phase, and we failed to impress upon the patient the necessity of a very prolonged and strict dietetic regimen, as well as a periodic follow-up examination. When he had a recurrence of his symptoms he did not seek relief until perforation had occurred. Drainage was ineffectual, and at autopsy the extent of the suppurative process was such as to resemble a carbuncle of the sigmoid, impossible to drain, producing an overwhelming toxæmia which explained his death.

An accurate diagnosis in this acute group presented great difficulties. The two most weird errors were the diagnosis of a perforated duodenal ulcer in one case, and of an acute cholecystitis in a second. We operated upon the first one, and the second case was operated upon elsewhere. The only justification for these diagnoses was the fact that the point of maximum pain, tenderness, and rigidity was in the right upper quadrant, and concentration on these findings led us into the error of incorrectly assessing the story of large bowel disturbance, both as regards the rate of flow and the character of the stool. All the other errors were in diagnosing acute appendicitis. This is not such a glaring error as may appear on the surface. In several of the cases operated upon the sigmoid occupied the right iliac fossa, and the perforation was under this quadrant. Even in retrospect, some of the cases presented a symptomatology which for us precluded an accurate diagnosis. Two such errors were made in accepting the disturbance of the large bowel, which was manifested by diarrhœa, as being due to the administration of a mild cathartic. If this had been more carefully assessed, one would have realized that the degree of disturbance was very disproportionate to the amount of cathartic taken. Pain in the lower abdomen, particularly in the left iliac fossa, radiating to the rectum and temporarily relieved by the passage of flatus or stool, is a very significant symptom. The palpation of a mass was not possible in any of these acute cases. There was one case, a male, aged 35, in which perforation of a single diverticulum occurred. The only diagnosis possible in this instance was the occurrence of an intra-peritoneal disaster due to the perforation of a hollow viscus.

In determining treatment the same principles are applicable as in any acute intra-peritoneal disease. First, one must correct the bio-

chemical disturbances which inevitably accompany the disaster by the intravenous administration of fluids and salt, the local application of heat, and the administration of sedatives. A delay of some hours while such therapy is being carried out is perfectly justified by the results. By adopting this principle we have, on our Division, operated upon 50 consecutive cases of acute perforation of duodenal ulcers without a fatality. In one instance of a man, aged 75 years, with a sixty-hour perforation, the time consumed by the above therapy between the admission of the patient to hospital and operation was eight hours. Second, we must remember in any operation for an abdominal emergency to carry out only the most simple surgical procedure which will deal adequately but solely with the lesion causing the emergency. Our only responsibility at this time is to save the patient's life. We lost one patient because we tried not only to save his life but to cure his diverticulitis by carrying out a Mickulicz procedure. This we believe was the essence of bad surgical judgment. We violated the above principles, which we have come to believe are fundamental in emergency surgical procedures for acute intraperitoneal disease. We now simply expose the area of perforation; we make no effort to close the perforation by suture. We believe that such an attempt is futile because of the infection and œdema about the perforation, and disastrous since it requires unnecessary trauma, which disseminates the infection and breaks down protective barriers already formed. A rubber tube is placed to the site of the perforation, and then the surrounding area is walled off by gauze which has been saturated in liquid paraffin containing BIPP. This method of drainage follows the suggestion of Dr. Fraser Gurd, of Montreal, who uses such in the treatment of an acute perforation of the appendix. In one case a coincident colostomy was done. This we find is an unnecessary procedure, and in addition is often difficult to close. If the obstruction be so severe as to demand decompression of the proximal colon, it is much better to do a cæcostomy. This has a four-fold advantage. First, it is a simple and very efficient procedure, if one remembers that it is essential to sew the bowel to the skin margin with interrupted sutures. Unless this be done, the cæcostomy will retract and become inefficient. We have abandoned the Weitzel type of cæcostomy. Second, it effectively deals with the obstruction by adequately decompressing the colon. Third, it is a safety valve if resection has to be done later, and this procedure is not complicated by the presence of a colostomy. Fourth, while this type of cæcostomy always has to be closed, it is an easy technical procedure.

The problem which confronts the clinician in cases of chronic diverticulitis presents difficulties which for us have been even greater than those present in the acute forms. Two major disasters may occur. First, our diagnosis of diverticulitis may be erroneous, the patient really suffering from a carcinoma of the colon. Second, failure or inadequacy of treatment results in obstruction from a scar, a peri-sigmoid abscess, or a fistulous communication with an adjacent viscus, most commonly the urinary bladder. Fortunately the association of carcinoma and diverticulitis in the same patient is relatively infrequent. In this group such a combination was present in only two cases. Fistulæ are not common. Only two cases in this group had fistulæ, and both involved the urinary bladder. Both had very definite pneumaturia. We have been impressed with the infrequency of pneumaturia associated with carcinoma of the colon, and are inclined to conclude that if it be present the fact lends weight to the diagnosis of an inflammatory rather than a neoplastic lesion.

Our greatest problem, however, is to arrive at the correct diagnosis of diverticulitis in its early stages, when we may hope, by adequate treatment, to prevent the long years of invalidism and later complications which this group of cases present. The age of the patient is of assistance. The following is the incidence of this group according to age, in cases where it was recorded:—

30 years	....	1 case single acute diverticulum
30 – 39 years	....	3 cases
40 – 49 years	....	9 cases
50 – 59 years	....	11 cases
60 – 69 years	....	7 cases
70 years	....	3 cases

We recall that diverticulosis is practically nonexistent under thirty-five years of age and diverticulitis rare under forty. We can therefore exclude this disease in the earlier years of life. The majority of the patients are between fifty and fifty-nine years of age. However, the

incidence of the age-group distribution of this study corresponds so closely with that in carcinoma of the colon that the diagnosis is still difficult. A long history of recurring, vague abdominal distress, with definite periods of acute illness, is characteristic. One patient had recurring attacks over a period of fourteen years; 10 had a history between five and six years; in the remaining group, the average duration of symptoms was one year; and 30 gave a history of definite acute attacks. Only 14 of the 44 patients had no remission from the onset until surgical measures became necessary. Thus in 66 per cent of the cases we are dealing with a chronic recurring abdominal disease.

Contrary to our previous impression, constipation is a very constant accompaniment. It was recorded in 37 cases, and present in 21, that is in over 60 per cent of the total group. In 5 cases gross blood was present in the stool, and what has astonished us, and is contrary to our former impression, was that tenesmus was present in only 8 cases. This symptom had previously made such a deep impression on us that we felt it was much more constant than this analysis proves it to be.

In 14 cases there was a definite history of attacks of diarrhœa. Acute intestinal obstruction, requiring emergency surgical procedures, was present in 5 cases. In one case the history, physical findings, and x-ray examination led us to the diagnosis of carcinoma (Fig. 1). We believe the ideal procedure in the presence of an acute obstruction is a blind cæcostomy, of the type previously described. Fever was recorded in 39 cases, and was present in 28 instances. This incidence corresponds fairly accurately to the history of acute attacks of abdominal distress lasting from a few days to weeks, which was present in 30 cases.

To summarize our diagnostic points:— The patient is over forty years of age; has suffered recurring, vague abdominal distress, mostly in the lower abdomen, often radiating into the rectum, and relieved by the passage of flatus or stool. Constipation, with rare bleeding and occasional diarrhœa, is present in a fair proportion of cases. Almost all patients will give a past history of attacks of acute abdominal pain, associated with fever. Abdominal palpation, unless a mass be present, is of little aid, except in the fact that the tenderness is below the umbilicus. Because of the mobility of the sigmoid, it may be in either right or left iliac fossa. Occasionally a rectal examination may reveal a tender, firm sigmoid loop lying in the pouch of Douglas, palpable through the anterior rectal wall. To this we now may add x-ray evidence. To state that this physical aid to diagnosis has great limitations is no reflection on the radiologist nor on this method of examination. It simply proves that its limitations are such that we and the radiologist must accept an equal responsibility in arriving at a

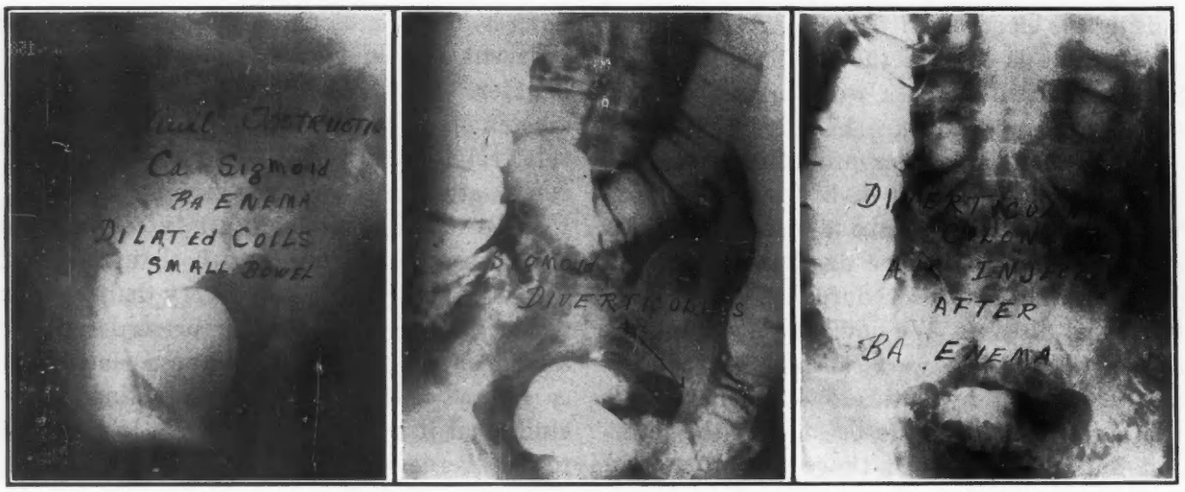

Fig. 1 Fig. 2 Fig. 3

Fig. 1.—(Mrs. A., aged 60. Case No. 9950).—This x-ray study shows evidence of acute intestinal obstruction due to sigmoid diverticulitis. Not until the microscopic report following resection was received did we know or suspect that this was not malignant. **Fig. 2.**—(Rev. W.P.H., aged 52. Case No. 9958).—This shows demonstration of diverticulitis by routine barium enema. **Fig. 3.**—(Same patient as in Fig. 2).—This shows the tremendously increased information available by use of air injection with contrast enema.

diagnosis. This diagnosis cannot be made with accuracy solely by x-ray examination. If such were true or possible, then we would have no diagnostic problem with this disease. X-ray studies were carried out on 30 of these patients, with the following results:—

Correct diagnoses	17
Indeterminate	5
Wrong diagnoses	8
4 diagnosed as diverticulitis	
1 was normal	
3 ultimately proved malignant	
3 diagnosed carcinoma	
3 later proved diverticulitis	
1 diagnosed normal	
later proved diverticulitis	

X-ray diagnosis alone, therefore, is absolutely correct in only 57 per cent of the cases. That the figure should be so high is indeed surprising and a high tribute to the care and skill of our Department.

The use of the contrast barium enema, in which, after plates are taken with the colon full, the major portion of the barium is evacuated and the colon distended with air introduced through the anal canal, is one of the most useful technical procedures in aiding this diagnosis (Figs. 2 and 3). In this group there was only one instance in which the x-ray report was a normal colon and a lesion found, and only one case in which a lesion was reported and a normal x-ray report was given. This probably indicates the greatest aid which x-ray studies can contribute. By this procedure we can definitely localize the site of the lesion in the colon. The variation of the x-ray defects in cases of diverticulitis and the mimicry in cases of malignancy render impossible in some instances the accurate differentiation of an inflammatory from a neoplastic lesion. Further, we have been impressed with the fact that it is impossible to accurately assess the progress of the local lesion solely by comparative x-ray studies taken over a period of months. In one case the area involved decreased in length, and the amount of spasm was infinitely less over a period of six months, yet the clinical picture of pain, abdominal distress, and local tenderness, with a lower fever, warranted exploration, and an abscess in the mesentery of the sigmoid was found. We must then conclude that the responsibility of the diagnosis of the exact nature and progress of this lesion should be shared by the radiologist and the clinician, with the latter holding himself responsible for the final decision. In this series, with all the available aids to diagnosis at our command, there were 13 diagnostic errors in both the acute and chronic group:—

Diagnosed as:	
Acute appendicitis	4
Perforated duodenal ulcer	1
Acute cholecystitis	1
Diverticulitis, ultimately proved carcinoma	5
Carcinoma, ultimately proved to be diverticulitis	2

Our diagnostic error in the chronic group is disastrous from the patient's standpoint. We erred five times in diagnosing diverticulitis when carcinoma was present, against two errors in diagnosing carcinoma when diverticulitis was the lesion.

Having established as accurately as possible the diagnosis of a chronic, non-perforating, non-stenosing sigmoid diverticulitis, what is the proper course of action? In this group there were only two cases in which operation was not undertaken. Each had a palpable mass, which subsided under conservative treatment. One of these patients, whose progress we have followed for a period of ten years, has had no serious recurrence. Our opinion therefore is valueless in commenting upon the proper treatment of the early phase of the disease. We are hoping in a future communication, in collaboration with our medical colleagues, to establish by end-results what should be considered efficient treatment early in the disease. The impression we have gained, however, from a study of this group of late cases is, that if the diagnosis had been recognized early in the course of the disease, and the seriousness of the lesion appreciated, the institution of prolonged bed rest and dietetic control for at least one month, followed by periodic re-examination and supervised diet for a period of one to two years, would result in a smaller number of these cases requiring surgical therapy. We, however, as surgeons, have been guilty of inaction in some cases seen in the late phase of the disease. In the group suffering severe, recurring disabilities which have resisted adequate dietetic control accompanied by bed rest, two points must be considered; first, the patient may be suffering from carcinoma and not diverticulitis; second, the degree and involvement of the sigmoid in the inflammatory process precludes its return to normal function. We believe in the past we have been too hesitant to advise resection in this group of cases. Such advice would not only save a marked invalidism and economic loss of

time, but would also protect the patient who in reality is suffering from carcinoma when the diagnosis is diverticulitis. There were 7 such cases in our group. In the instances where the lesion occupies the free sigmoid loop the Mickulicz type of resection is the ideal procedure. There is a group of cases, however, where the lesion extends so far caudalwards that such a procedure is mechanically impossible. In this group, the telescopic method of anastomosis is safe and avoids a colostomy. This is a procedure we are apt to forget when confronted with such a problem. Our results with this technique permit us to endorse it heartily. In one case this procedure was successfully carried out in the presence of a sinus which drained through the right iliac fossa. In no case in which we have successfully performed a resection has there been a recurrence of the diverticulitis, despite the fact that diverticulosis was present in several instances proximal to the site of division of the bowel. This knowledge and the cooperation of the patient, placed on a suitable diet and regimen, prevent the recurrence of the inflammatory process.

One case has impressed us with the tragedy of delay. This man was seen at intervals since 1927, suffering from recurring acute attacks, which could be brought to quiescence by bed rest. He suffered an acute perforation in July, 1934, and finally had to face a resection in September, 1935. Despite the fact that our surgical procedure has successfully dealt with his organic lesion, his prolonged invalidism and distress have resulted in a complete loss of his morale, so that he is economically useless and unable to enjoy life or to be of any comfort to his family. Had he been so advised and had he accepted resection several years previously he would have been well.

The cases which have a definite mass when first seen by the surgeon present a different problem. We cannot too strongly emphasize our opinion that these patients should never be considered as candidates for a precipitate emergency operation. The biochemical disturbances inevitably associated with this clinical state should be corrected, as outlined above, before considering any therapeutic procedure directed to the local lesion. The improvement which accompanies this preliminary treatment is often spectacular, often resulting in a complete disappearance of the mass, and always justifies the delay necessary.

In this series there were 21 cases presenting a palpable mass. In none was an emergency procedure carried out. In 2 no operation was necessary, as bed rest caused a disappearance of the mass. One of these patients has been followed for ten years and, apart from occasional minor distress in the abdomen, has remained well. The following Table indicates the treatment and the results:—

Total cases with abscess		21
Simple drainage		11
Recovered	6	
Died	5	
(2 ultimately proved carcinoma)		
Drainage and later resection		4
Recovered	3	
Died	1	
Drainage and colostomy		4
Recovered	1	
Died	3	
(all ultimately proved to have carcinoma)		

An analysis of the 5 cases in which death followed simple drainage shows only one as an immediate post-operative death. Autopsy revealed what amounted to a carbuncle of the sigmoid, which it was not possible to drain adequately, the patient dying of toxæmia. Two patients were ultimately proven to have carcinoma and died some months later. The fourth died two months later of pneumonia. We have no note as to cause of death in the fifth case. In the group with drainage and coincident colostomy the three patients who died were ultimately found to have carcinoma. These facts should settle the discussion as to the necessity of a colostomy as an accompaniment of drainage of the abscess. We believe that simple drainage, with a minimum of trauma, using a rubber tube and gauze soaked in liquid paraffin containing BIPP as in the acute cases, will accomplish everything which we have to offer surgically. One great lesson which we should learn from this group is never to condemn a patient as suffering from a hopelessly inoperable carcinoma of the left large bowel until we are certain that we can exclude diverticulitis as the etiological factor.

SUMMARY AND CONCLUSIONS

1. Diverticulitis of the sigmoid colon is present more frequently than it is diagnosed.

2. Failure of early diagnosis and adequate treatment is followed by serious complications.

3. A symptomatology of this disease is outlined.

4. A suggested treatment for the early cases is presented.

5. In the presence of an acute perforation, after correcting biochemical disturbance, simple drainage, using a rubber tube surrounded by gauze soaked in liquid paraffin and BIPP, is adequate treatment.

6. If a mass be present and drainage required, simple drainage without a colostomy is efficient.

7. If acute obstruction be present cæcostomy is the ideal procedure.

8. X-ray studies alone cannot accurately determine the differentiation of neoplastic and inflammatory lesions of the colon.

9. An analysis of the history and the physical findings should be considered of paramount importance in arriving at the correct diagnosis of sigmoid diverticulitis.

10. Never dismiss a patient as suffering from a hopeless carcinoma of the sigmoid until diverticulitis as the etiological factor is definitely excluded.

STUDIES IN MINERAL METABOLISM*

III. CALCIUM AND THE KIDNEY: EXPERIMENTAL II.

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IN the preceding paper[1] we described the types and sites of early calcium deposits in rats injected with parathyroid extract and some methods by which the kidney rid itself of the calcium. In the present will be described the parenchymal and interstitial changes which have been observed to date. The data are derived from 147 injected animals and 86 controls. The longest experiment here recorded was 174 days. Some of the rats are being carried on, to observe the late results.

GROSS RESULTS.—

Three types of gross kidney lesion have been produced: (1) cystic dilatation of tubules without pelvic change (Figs. 1 and 2); (2) irregular pelvic dilatation with more or less cystic tubular dilatation (Fig. 3); (3) chronic focal nephritis with a mildly granular kidney surface and very slight cystic change (Fig. 4). At a loss to account for the divergent pictures, we simply record them and the treatment under which they developed.

MICROSCOPIC LESIONS.—

A. *Tubular and interstitial.*

1. *Slight general dilatation.*—This is often appreciable within the first 24 hours. It may recede but more commonly persists to some degree.

2. *Rapid ballooning without associated productive reaction.*—This is focal, frequently fasciculated, occurs most commonly in the papilla (see tip of papilla in Fig. 3) or about the fornices of the pelvis, but may extend into the cortex. It is apparently related to the fine, dustlike, interstitial deposit of calcium previously described.[1] Further, it probably plays an important part in the production of the irregular, dilated pelvis (Fig. 3).

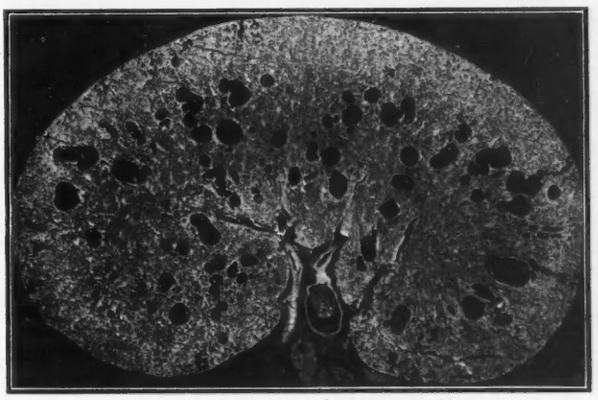

Fig. 1.—Rat 19 P 7, killed at 51 days. Injections begun at 5 days; 2 units x 3, 3 days' rest; 3 units x 3, 3 days' rest; 4, 5, 6, 10 units, 3 days' rest; 10 units x 2, 25 days' rest. Moderate widespread cystic dilatations of medulla and slight dilatations in cortex.

3. *More slowly developing focal dilation, frequently accompanied by a peritubular reaction.*—This in varying degrees has developed in every experimental animal. Within 48 hours of the injection of as little as 2 units into 5-day

* From the St. Agnes Guild Laboratories of the Children's Hospital of Winnipeg.

† Junior League of Winnipeg Fellow in Pædiatric Research.

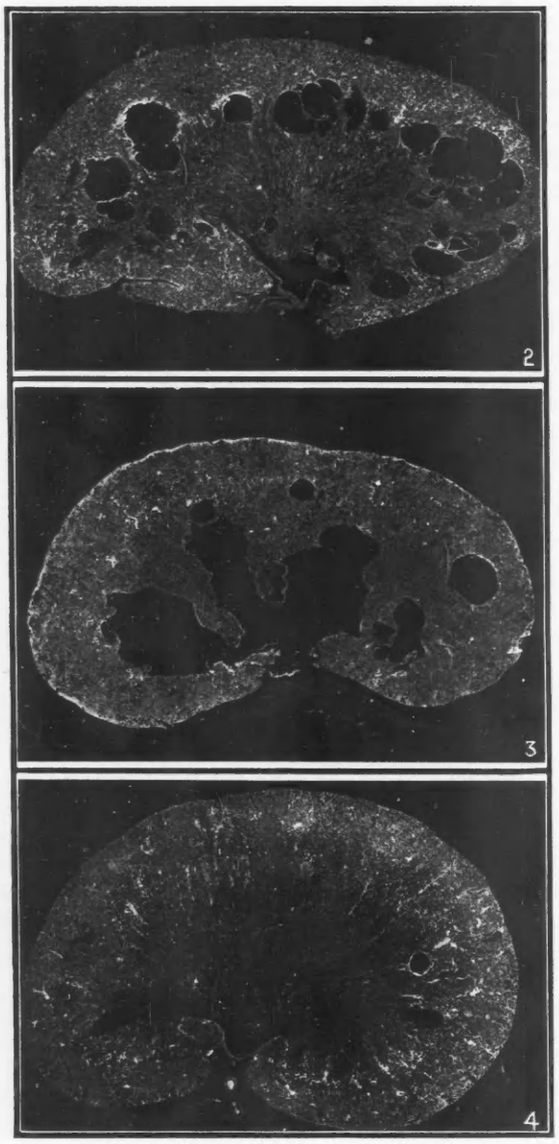

Fig. 2.—Rat 9 P 4, killed at 144 days. Injections begun at 5 days; 2 units x 3, 25 days' rest; 2, 3, 7, 7, 7, 13, 13 units, 23 days' rest; 5, 10, 20, 20, 40 units, 27 days' rest; 5, 10, 20, 20, 20, 40, 40, 40 units, 38 days' rest. Marked cystic dilatation of cortico-medullary junction with cortical compression and also cortical irregularity due to focal tubular shrinkage and fibrosis.

Fig. 3.—Rat 5 P 1, killed at 103 days. Injections begun at 3 days; 2 units x 2, 1 day's rest; 2 units x 1, 1 day's rest; 2 units x 1, 3 days' rest; 3 units x 1, 1 day's rest; 3 units x 3, 2 days' rest; 4 units x 5, 5 days' rest; 5 units x 5, 5 days' rest; 6 units x 5, 31 days' rest; 5, 10, 20, 20, 20, 40, 40, 40 units, 17 days' rest. Marked pelvic irregularity, slight cyst formation, irregular cortical fibrosis. The early injections had to be interrupted to keep the rat alive.

Fig. 4.—Rat 5 P 2, killed at 174 days. Injections as in 5 P 1, and then continuing as follows, 12 days' rest; 5, 10, 20, 20, 20, 40, 40, 40 units, 53 days' rest. Calcium still present. Almost no cysts; patchy cortical fibrosis and dilatation. Note different response in litter mates 5 P 1 and 5 P 2.

old rats dilated tubules can be seen here and there throughout the medulla, less often in the cortex. Even as early as this some contain pus. If the animals receive no more injection and are killed six weeks later the kidneys have returned almost to normal. There may remain a very occasional dilated tubule and a few minute foci of interstitial increase. If, on the other hand, periods of injection alternating with periods of rest are continued the dilatations, particularly those at the cortico-medullary junction, increase, becoming visible to the naked eye.

The epithelium of the dilated tubules is low cuboidal or flattened, occasionally transitional. About them occur proliferative changes, from necklets of fat fibroblasts to actual fibrosis (Fig. 5). In the lumen may be seen pus cells, large round cells with round nuclei, or fresh or changed red blood cells. More often they are empty. After the first three months some tubules are distended with albumin. Histological appearances suggest that contiguous dilatations may break into one another, and that those near the pelvis may rupture into it (Figs. 1, 2 and 3).

4. *Tubular degenerations and interstitial increase.*—Several changes occur in some of the remaining tubules of cortex and medulla. As early as 13 days after the first injection small areas of tubular collapse may be seen in the cortex. The cells stain blue. The nuclei are large and translucent. The cytoplasm may be decreased or swollen. A thick, homogenous band is seen around the tubule (Fig. 6). This stains pink with eosin, blue with Mallory's connective-tissue stain. The lumen may be entirely obliterated. Other neighbouring tubules are dilated and their epithelium flattened. To this picture are added, especially in the cortex, interstitial tissue proliferation and small round-cell infiltration; in the pyramid the interstitial tissue may be œdematous. In only one instance has an interstitial focus of polymorphonuclear cells been seen. Normal tubules are mingled with the pathological or lie between in larger or smaller groups. As time goes on the areas of diseased tubules shrink, the kidney surface becomes granular, but so far we have not seen the capsule become involved.

B. *Glomerular lesions.*

The glomerular changes are no less striking than the tubular, although they are not recognizable so early. We have never seen calcium

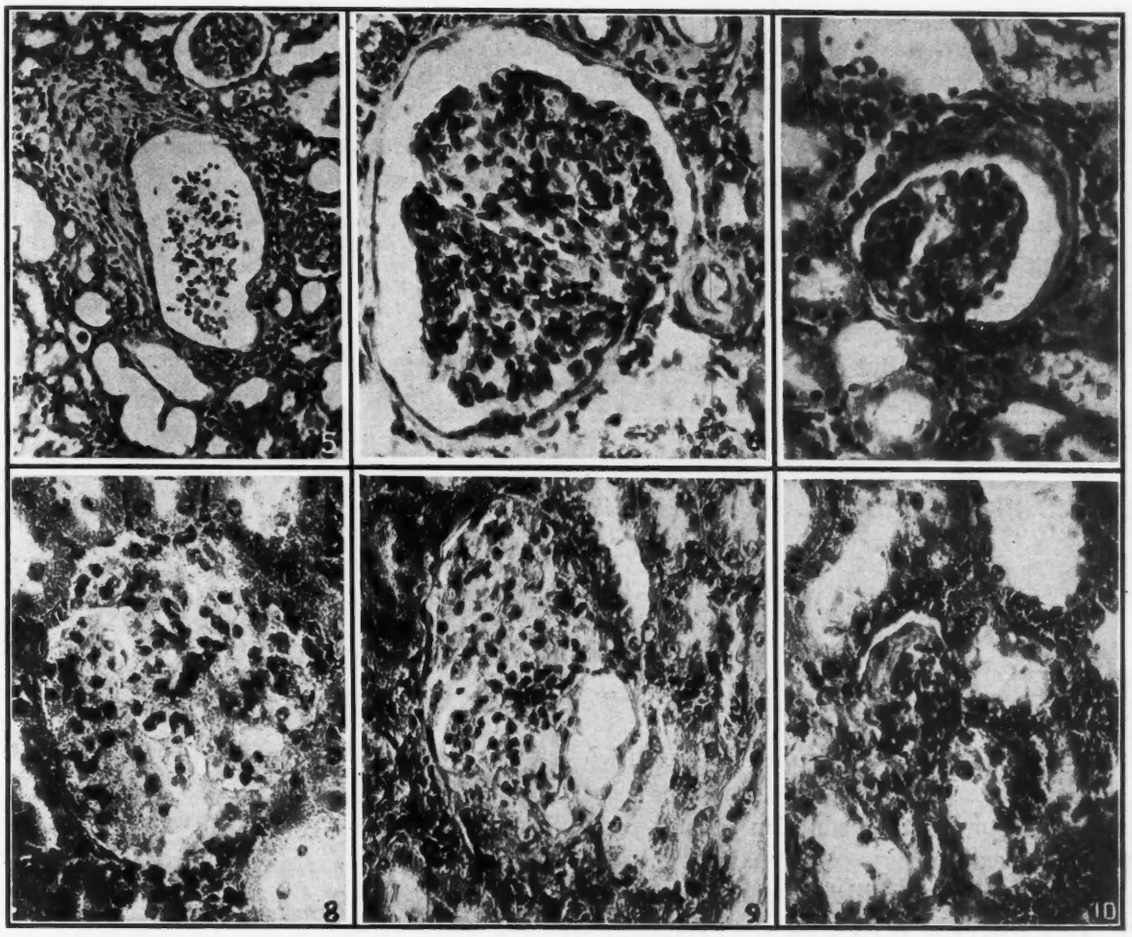

Fig. 5.—Tubular dilatation, peritubular fibrosis, pus in tubule. X 150. **Fig. 6.**—Hyalinization of periglomerular and peritubular membranes. Rat 5 P 2, see Fig. 4. X 400. **Fig. 7.**—Rounding up of capsular cells, thickening of membrane and shrinking of tuft. Rat 5 P 3. Litter mate of 5 P 1 and 2, killed 12 days after 5 P 1 without further injection. X 400. **Fig. 8.**—Swelling and necrosis of glomerulus. Rat 49, age 53 days. Injections beginning at 3 days of 2, 3, 4, 5 and 6 units, each dose for 5 days with 5 days' rest between. X 400. **Fig. 9.**—Vacuolation of glomerulus. Rat 8 P 7. Same treatment as Rat 49 but started at 5 days. X 400. **Fig. 10.**—Glomerular remnant. Rat 8 P 7. X 400.

deposited in glomeruli. In animals killed from 53 to 174 days after the first injection the following changes were seen: (1) great variation in size, from giants to pygmies; (2) thickening of the basement membrane outside the cells of the capsule (Fig. 6), (this was a common and early finding); (3) rounding-up of the cells of the capsule (Fig. 7) (this was less common); (4) necrosis or hyalinization of a part of the tuft, with or without proliferation of the epithelial cells, and with or without vacuolation (Figs. 8 and 9); anæmia of the glomerulus, with shrinking of the whole apparatus which might become extreme (Fig. 10). We have not so far observed the formation of glomerular pearls. The glomeruli become reduced in number, apparently through a process of atrophy and resorption.

Following the early injections calcium remained within the tubules but a short time.[1] After the later injections it remains longer and is heavier. Local injury about the deposits takes place to some extent, though most of the damage is not in juxtaposition to precipitated calcium salts. The sites of deposit are patchy, and, correspondingly, the kidney injury is patchy. The medulla is always more heavily peppered than is the cortex, disease in the latter being partially dependent apparently upon medullary lesion. The calcium eventually disappears from the tubules, even after heavy bombardment, only traces then remaining in the interstitial tissue.

DISCUSSION

It appears reasonably certain that the pathological changes described depend upon deposition of insoluble calcium salts, but how these act, and why one rat develops a simple focal nephritis,

another polycystic disease, and a third great pelvic irregularity, we do not know. We do feel that these experimental facts lend weight to the suggestion previously made on clinical grounds[2] that some cases of human pyelonephritis and some cases of polycystic kidney have a fault in mineral metabolism as their primary cause. They tempt one, too, to play with the hypothesis that repeated small injuries by simple minerals may lie at the back of some of the other chronic nephritides. But such an idea still lies in the dim realm of speculation.

SUMMARY

The parenchymal and interstitial lesions developing in young white rats during the first six months of injection of parathyroid extract (Collip) have been described. The end-results will be reported later.

The microphotographs illustrating this article were taken by Miss Nason, of the Department of Pathology of the University of Manitoba, by kind permission of Professor William Boyd.

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FIXED SKELETAL TRACTION IN THE TREATMENT OF CERTAIN FRACTURES AT THE WRIST

BY J. A. MACFARLANE AND R. H. THOMAS

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Toronto

EXTENSION accurately applied in the direction of the long axis of the bones is the most important factor in the reduction of any fracture of the extremities. The maintenance of extension during immobilization is necessary in those fractures where comminution is marked or where the ends of the fracture are oblique or spiral. In the lower extremity maintained extension has been an accepted principle, but in the upper extremity adequate extension has been frequently sacrificed because it has not been possible to use it in conjunction with an ambulatory type of splint. With the advent of the Kirschner wire and Boehler's methods of using plaster of Paris it is possible in the upper extremity to use maintained extension and allow the patient to get about as usual. In the past year we have seen two rather unusual cases of fracture-dislocation at the wrist. The fracture was one through the anterior articular surface of the radius. The small fragment was displaced forwards and carried the carpus with it. In this type of injury, as well as in badly comminuted Colles's fractures, we have found that skeletal traction combined with skin-tight plaster is extremely satisfactory.

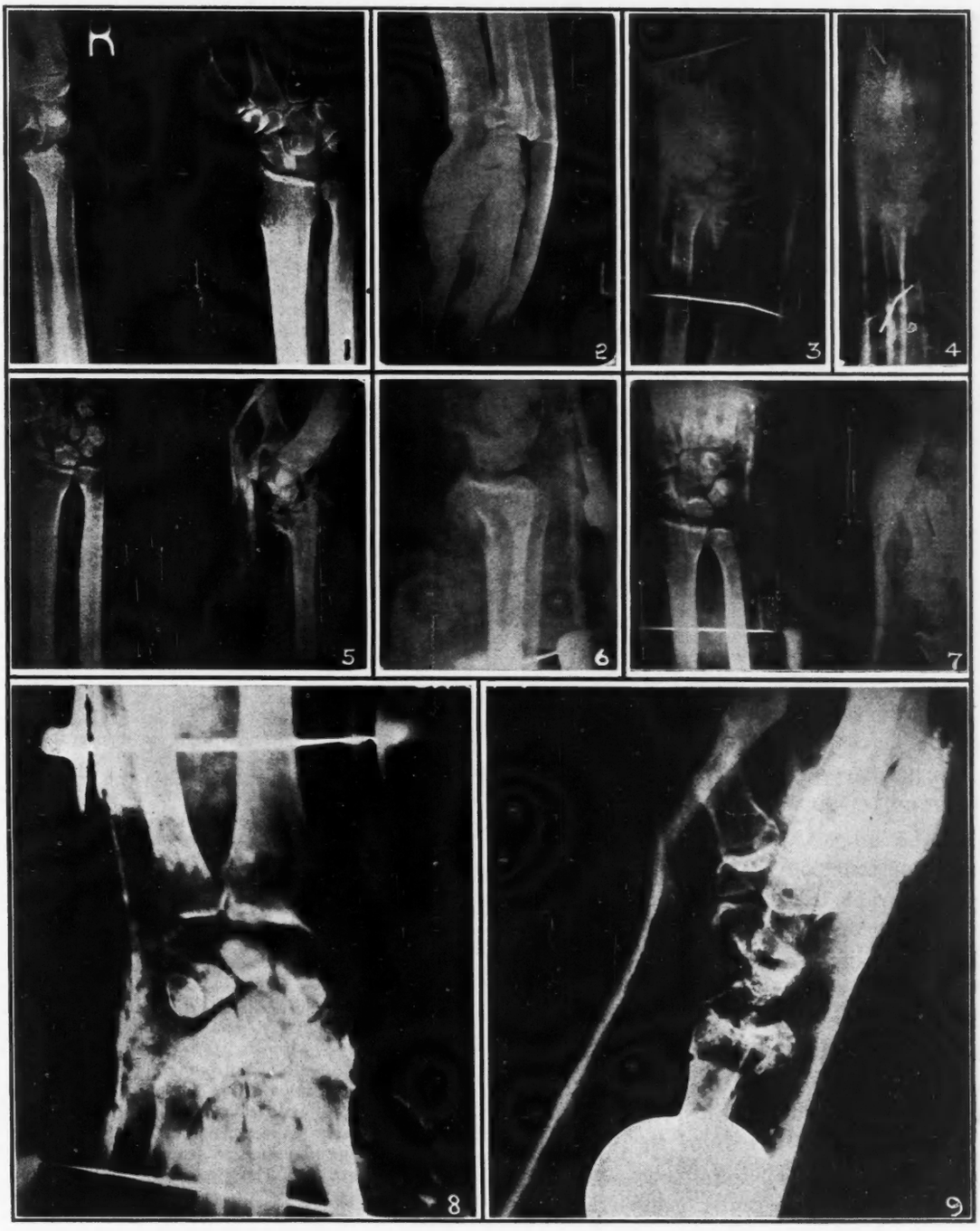
CASE 1

A man of 50, a workman, fell from a ladder on some rough ground. He is not sure how he struck the ground, but thinks that his left hand was flexed at the wrist. He injured both wrists. The x-ray of the right one showed a dislocated semilunar bone and a fracture of the styloid process of the radius; the left, a fracture-dislocation of the type noted above (Fig. 1). The dislocation of the semilunar was reduced, and an attempt made to reduce the fracture-dislocation by straight extension. Reduction was easily effected, but as soon as the limb was released the displacement recurred. Anterior and posterior splints were applied as for a Colles's fracture, and Fig. 2 shows the result. The following day the radius and ulna were transfixed with a stout wire about 2½ inches above the joint. The outer four metacarpals were transfixed through the distal third of the shafts. Now, with the elbow fixed and extension strongly applied through the hand, a skin-tight plaster was applied, moulding it carefully about the wires. Extension was maintained until the plaster had hardened. Figs. 3 and 4 show the reduction. They also show that spreaders or discs should have been used because a slight amount of the extension has been lost by the bending of the wires between the bone and skin.

Subsequent course.—There was very little swelling of the fingers and it was not necessary to split the plaster. The fingers were moved actively from the first day. The wires and splint were removed in 4½ weeks. There was scarcely any reaction about the site of entry of the wires and about half the normal range of motion at the wrist was present immediately. The man was able to return to work at the end of six weeks from the day of his accident.

CASE 2

This man, aged 39, was thrown from a bicycle and injured his wrist, but was unable to describe the exact way in which he fell. The x-rays made shortly afterwards showed a fracture-dislocation at the wrist with the small radial fragment with the carpus carried forwards. Attempt at reduction and splinting as in Colles's fracture was unsuccessful (Fig. 5). He was then treated by double transfixion and skin-tight plaster, and x-rays made the following day showed excellent position (Figs. 6 and 7). This patient wore his plaster for 4 weeks. X-rays made at the end of that period showed union with the previous position maintained. Again, there was a very free range of motion in the wrist joint when



the plaster and pins were removed, and he was able to resume his work in a fortnight. Spreaders were used in this case to maintain a taut wire.

Case 3

A woman of 52 fell down a stairway and suffered a badly comminuted Colles's fracture. The first attempt at reduction failed. Two days later, under brachial plexus block, reduction was effected by double transfixion and skin-tight plaster (Figs. 8 and 9 show the result of this latter procedure). The plaster and pins were removed in 4½ weeks, and movement at the wrist through half its normal range was immediately possible. This patient was seen again in 4 weeks and an excellent anatomical and functional result was noted.

Comment

In fracture-dislocations of the type described, as well as in severely comminuted Colles's fractures, effective extension must be used to obtain accurate reduction. Double transfixion and skin-tight plaster is a safe and effective means of treatment, and the final results are satisfactory. It was with considerable trepidation that this method was first used, because of the fear of swelling and interference with circulation. It is quite true that such cases must be

carefully observed for signs of circulatory embarrassment, but in none of these cases was there any undue swelling. We believe that if proper traction is applied and the fragments are thus "pulled" rather than "pressed" into position, as would be the case with the usual type of moulded forearm plaster slabs, there is very much less likelihood of swelling.

A CASE OF MALIGNANT EXOPHTHALMOS*

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NUMEROUS surgical procedures have been done in the past to correct the defective closure of the eyelids incident to exophthalmos in exophthalmic goitre and in cases of exophthalmos of unknown origin; all have the same purpose, namely, to present ulceration of the corneæ and destruction of the globe. One of the following three methods has been generally used. The first consists of operation on the eyelids directly; the second aims at modifying the sympathetic nervous supply of the orbital contents; and the third, and most recent one, consists in decompressing the roof of the orbit and optic foramen, thereby releasing the orbital contents and pressure on the optic nerves.

E. Fuchs and Axenfeld were the first to advocate operation on the eyelids and they reported favourable results in their cases. However, in an extreme exophthalmos the lid operation is not possible. Jaboulay, in 1896, was the first to perform cervical sympathectomy. Fairly good results were obtained with this method. In 1912 Tinker performed a modified Kronlein-Kocher osteoplastic resection of the outer wall of the orbit. He removed the fat and resected a portion of the outer wall of the orbit with favourable results. The Naffziger operation, performed on the case under consideration, is indicated in defective ocular movement, reduction of vision, and changes in the optic nerves, three conditions that were present in this instance.

REPORT OF CASE

A male, married, 46 years of age, was admitted to the Jewish General Hospital, Montreal, in April and May, 1935, with complaints of bulging of the eyes, redness and tearing.

Present illness.—Some time in the latter part of 1934 some of the patient's friends called attention to the fact that the outer corners of his eyes were red. He went to a local physician who gave him drops for his eyes, but they did not improve; the redness became more marked and gradually spread over the entire whites of his eyes. He then noticed that his right eye was much more prominent than the left. About the same time he noticed his eyes were tearing a great deal. He went from one physician to another, all of whom gave him drops, none of these being beneficial.

About eight months before I saw him he was in the Civic Hospital in Ottawa, where he was studied for three and one-half weeks. He was discharged unimproved and told that they could find no cause for his trouble. He returned to work. His wife remarked that he had been sleeping with his eyes open for the last four or five months. When he awakened in the morning the inflammation was much more apparent. He has always felt quite able to do hard work; never had any headaches. His vision had been slightly diminishing in the subsequent three or four months. He also stated that his eyes did not move about as freely as possible. He noticed that on walking he had to bend his head down frequently to find his pathway. There was no tendency to perspire, no nervousness, and no tremor or goitre. He was never depressed. He got along well with people, conducted his business in an active manner, and never had any muscular weakness. He had had no attacks of fainting and no convulsions; always had regular eating and sleeping habits; drank no alcohol and smoked cigarettes moderately; he never used drugs.

Family history.—Negative.

Physical examination.—A well developed, middle-aged man. In general, he appeared to be in good health; he was clear mentally and cooperative; there was no jaundice and no cyanosis. The cardiovascular examination revealed a systolic murmur at the apex and also at the aortic area, and a faint systolic murmur was heard also at the pulmonic area. The blood pressure was 104/64; the lungs were normal. The nervous system was normal, and the abdomen was negative excepting for an epigastric hernia. The teeth showed marked peri-odontoclasia.

Examination of the nose and throat.—Nose normal, excepting for hypertrophy of the middle turbinate. In the mouth there was a bulging or swelling in the region of the canine fossa. Posterior rhinoscopy showed that on each side of the posterior margin of the vomer there was a smooth swelling, apparently hanging down from the anterior sphenoidal wall, projecting down into the naso-pharynx. The swelling encroached on the pharyngeal apices of the Eustachian tubes.

Biopsy from the naso-pharynx.—"The tissue appears to be that from the naso-pharynx, though some of it resembles that from salivary gland. There is a variable amount of mucoid material in the acini of the salivary gland and some of the acini are slightly dilated."

X-ray of the nose and throat showed a soft mass in the naso-pharynx. This mass had a smooth, round anterior border which extended forward about 3 cm. to the anterior arch of the atlas.

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* From the Ophthalmological Service of the Jewish General Hospital.

Laboratory examination.—The basal metabolism was normal. The urine showed a trace of albumin and sugar but no acetone. Microscopically, there was an occasional hyaline cast and white blood cells; no red blood cells. Blood: hæmoglobin, 100 per cent; white cells, 7,150; red cells, 5,200,000. The blood Wassermann test was negative; spinal fluid, Wassermann test, negative. Proteins, 37.9 mg. per cent. Stool examination, positive for benzidene; no parasites seen. The sugar tolerance test was normal. Non-protein nitrogen, 26.1; inorganic phosphates, 3.54 mg.; phosphorous, 10 c.c.; serum cholesterol, 267 mg.; urea, 35.2; creatinine, 1.23; calcium, 11.05.

X-ray of skull.—"Stereo axial views of the base of the skull show no evidence of bone destruction. Antero-posterior and stereoscopic right lateral views of the skull show a vault of average thickness which presents no evidence of increased intracranial pressure. The suture lines are completely closed. The sella turcica is long and

Fig. 1 Fig. 2

Fig. 1.—Appearance of the patient showing high degree of exophthalmos a month before operation. **Fig. 2.**—Photograph of the patient taken on August 11, 1936, a year after the operation.

flat. The clinoid processes are intact. The pineal is calcified and is not displaced. The superior orbital plates extend downwards considerably lower than usual and this decreases the size of the bony orbits. Stereoscopic views of the optic formina show no deformity."

Ocular examination.—There was congestion of the bulbar conjunctival vessels. The mobility of the eyeballs was limited outward and inward, but not upward. There was no power of binocular convergence. The lower half of the corneæ showed ulceration below the pupillary area, more marked in the right than in the left eye. There was a moderate degree of photophobia and lacrimation. The Hertel exophthalmomter registered 27 mm. before each eye. The von Graefe, Dalrymple and Stellwag's signs were strongly positive. The tension was normal. The visual fields were normal; the fundi showed slight atrophy of the temporal sides of the discs. The retinal arteries and veins were normal. The pupils were moderately dilated and reacted to light both directly and consensually. Vision of the right eye was 20/80, with a minus sphere of 3 dioptres. The left eye was 20/60 with minus sphere of 4 dioptres.

During the course of the patient's stay in the hospital, the exophthalmos increased, the measurement being 29 mm. for each eye. The ulceration in the right cornea showed signs of spreading, and, fearing further damage to the eye, a consultation was held with Dr. Cone, who, on May 18, 1935, advised having the patient sent to the Montreal Neurological Institute for a decompressing operation. He was operated upon on the following day. The operation consisted of a bilateral frontal osteoplastic craniotomy with decompression of the orbits.

Procedure of operation.—Under avertin and ether anæsthesia a bilateral osteoplastic flap was reflected. The dura was elevated to expose the floor of the anterior fossa as far back as the lesser wing of the sphenoid. The bone of the floor was removed just as widely as possible, unroofing each of the optic canals, and carrying the removal latterly and posteriorly as far as possible. The orbital fascia was widely incised and reflected. The optic nerves and globes were exposed. When as wide a decompression as possible was obtained the bone flaps were returned to position, but not tied in place. The scalp flaps were closed in two layers.

As soon as the floor of the skull was removed, decompressing the orbits, a little tissue herniated into the openings and continued to bulge through the openings as the bone removal was continued. No definite pathological alterations could be made out. It was Dr. Cone's impression that there was a brown œdema of the orbital fat of the connective tissue and of the muscles. The muscles themselves seemed somewhat larger than usual and they were not quite as red as normal muscles are. No evidence of tumour within either orbit was noted. A small piece of muscle was taken from each side for study. This came probably from the levator on the left side and from the superior rectus of the right.

Report from the laboratory of the Neuropathological Department.—Specimen of levator palpebræ superioris. "(1) The muscle is of normal appearance, but one large vessel has an extensive collection of lymphocytes; (2) Bone from orbital ridges; no abnormality is detected in the bone; (3) Bone from calvarium; this bone was unusually soft; it is entirely composed of marrow which probably accounts for its consistency. *Diagnosis.*—No demonstrable disease."

Post-operative course.—The day following the operation there was a marked chemosis of the conjunctiva and inability to close the eyelids. The eyeballs were protected with vaseline and cellophane dressing, and frequent irrigation with warm boracic solution was carried out. On May 29th the ulcer of the right cornea perforated, with slight prolapse of the iris at six o'clock. The tension was minus. The anterior chamber was abolished and the pupil was contracted.

On June 7th a median tarsoraphy was done on the right eye, but owing to extreme œdema of the conjunctiva and proptosis of the globe the sutures were expelled on the third day.

June 10th.—Proptosis of the eyes was much less, and the perforation of the right cornea closed and showed signs of cicatrization.

June 11th.—Patient was referred back to the Jewish Hospital for further treatment and observation. His eyes were treated with vaseline over the corneæ and irrigation daily with boracic solution.

The patient continued to make rapid progress towards recovery. The right cornea showed a wide scar over the perforated area. The scarring of the left cornea was less pronounced, the bulbar conjunctival congestion became much less, and the corneæ were observed to be well covered by the eyelids during sleep. However, for a period of about 10 days he complained of intermittent pain in the left ear, in spite of the fact that on several occasions an examination of the ear did not reveal the cause of his symptoms. The patient was almost ready to be discharged from the hospital, when the pain in the ear appeared again with great intensity and with a swelling behind the ear. The examination this time revealed a post-auricular abscess, with a definite fluctuating area. The abscess was opened by Dr. Stein under gas and oxygen anæsthesia, and was found to extend down to the bone. The whole procedure lasted a short time, when, without warning, the patient suddenly stopped breathing, much to the dismay

of everybody present. Artificial respiration was immediately instituted, in addition to carbon dioxide and oxygen. After a period of about four hours he was revived and the examination disclosed the following. (Dr. Viner and Dr. Schulman). Stertorous breathing; cyanosis; coma; and profuse perspiration. His head was turned to the right and there was conjugate deviation of the eyes to the right. The lids were wide open. The left cheek blew up more prominently than the right on expiration. There were involuntary tremors of the extremities at irregular intervals, which occurred first in one limb and then the other; there were occasional tremors of the abdominal muscles. The neck was rigid. Brudzinski's sign was absent. The upper and lower extremities were rigid and could not be flexed. The reflexes were hyperactive. There was transient ankle clonus. There was a slight Chaddock on the right. The superficial reflexes were absent. The spinal tap showed clear fluid under normal pressure.

The next day the patient appeared to be more comfortable. The upper extremities were flexed and lying on his chest. His hands were also flexed and abducted. The left knee was slightly flexed. The jaw could be opened, and there was a positive jaw jerk. Other reflexes were active. The right Chaddock was still present. The right upper abdominal and cremasteric reflexes were present. There was some return of sensation to pin pricks. Dr. Cone was called in consultation, and from the history and neurological findings believed the condition was due to anoxæmia following anæsthesia. Between July 13th and 17th patient gradually returned to consciousness. At first memory for past and recent events was markedly impaired, but this gradually returned to normal. The reflexes became normal. Sensation returned to normal.

During the course of the patient's unconsciousness he was given 10 per cent glucose in 1,000 c.c. of saline, followed by calcium gluconate 10 c.c., intravenously, and also caffeine and sodium benzoate subcutaneously.

About six weeks after patient's discharge, his mental condition showed no change in spite of the anoxæmia, and he had no complaints to make in respect to his eyes. The ocular examination showed a dense scar of the lower right and a faint one over the lower left cornea, and an anterior synechia of the iris of the right eye. There was little bulbar congestion. The proptosis measured 25 mm. of each eye. The vision with correction was 20/60 left, and 20/120 right eye.

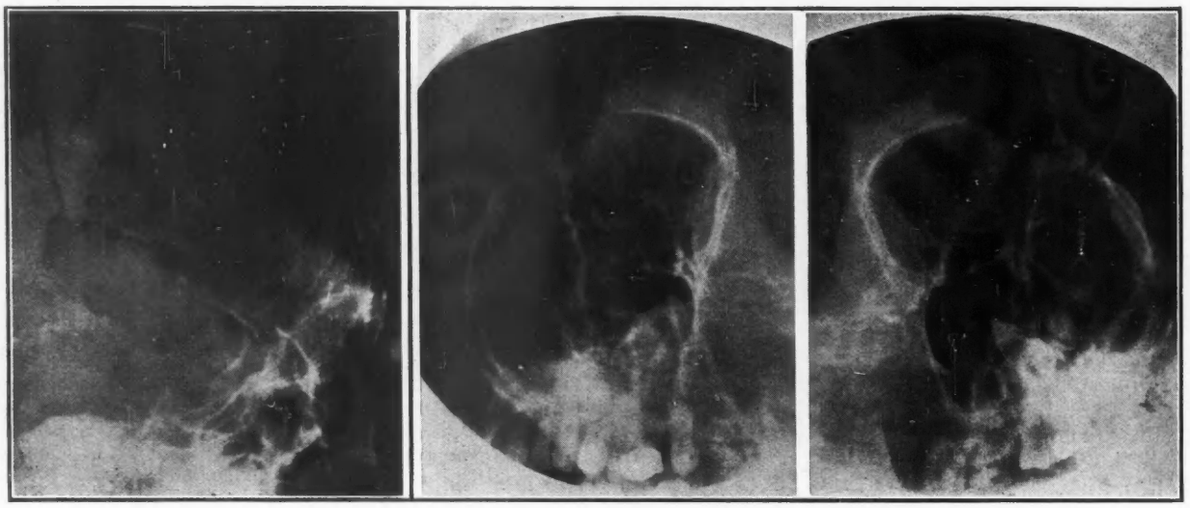

Fig. 3 Fig. 4

Fig. 3.—Lateral view of the skull showing the removal of the superior orbital plates.
Fig. 4.—Antero-posterior view showing the removal of the superior orbital plates on both sides.

COMMENT

Several clinical features of this case are particularly interesting. The rapid exophthalmos was unassociated with any of the known causes, namely, exophthalmic goitre, pituitary disturbances, orbital tumour, acromegaly, myelitis, syphilis, trichinosis, Recklinghausen's disease, multiple xanthomatosis, diabetes insipidus, Schüller-Christian syndrome, various forms of leukæmia, and hypertension nephritis.

The section of the muscles and bone removed showed no abnormalities. The case under consideration falls under the category of so-called "malignant exophthalmos", a condition in which no cause can be determined. In extreme cases ulceration of the cornea is followed by panophthalmitis, hence the name of "malignant exophthalmos". The degree of exophthalmos is much greater than is that of the exophthalmos which is associated with elevated basal rate, œdema of the eyelids, and, as a rule, with chemosis of the conjunctiva.

SUMMARY

A case of malignant exophthalmos is described in which a thorough and painstaking examination failed to reveal the cause of the exophthalmos.

About a month after a Naffziger operation was done for the relief of the exophthalmos and ulceration of the corneæ the patient de-

veloped a post-auricular abscess, which, after being opened and drained, was followed by the patient becoming suddenly unconscious and remaining in that state for nearly two days. The cause of the unconsciousness was attributed to anoxæmia, possibly aggravated by the abnormality of the naso-pharynx. After the patient regained consciousness his recovery was rapid, and in three months he returned home to resume his usual occupation.

Thanks are expressed to Dr. W. V. Cone for his kindly interest in this case, and for his courtesy in allowing me to observe the patient while under his service in the ward, and also for the use of the operation and x-ray reports.

THE FUNCTION OF THE PYLORIC SPHINCTER*

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NEARLY every textbook of physiology speaks of the pyloric sphincter as being usually "closed", and that it "opens" to permit the passage of stomach contents. For years it has seemed to me that the evidence for these statements was not convincing, and that many of the numerous papers on the "control" of the sphincter were written under a misconception regarding its structure and function.

The word "pylorus" is found frequently in the works of Galen (*circa* 200 A.D.), but is of much earlier origin. "Pylorum" was used by Aurelius Cornelius Celsus about 25 A.D., and he speaks of its use by previous Greek writers. It should be noted in passing that the expression was undoubtedly applied to the whole of the distal portion of the stomach and not merely to the pyloric sphincter (McMurrich). The literal meaning of pylorus is "keeper of the gate", and presumably the Greek physicians regarded it as having the ability to regulate the evacuation of gastric contents.

A brief review of some of the literature may be instructive. Beaumont contributed little, because his St. Martin's fistula was too far from the sphincter to permit accurate observation. Rossbach[1] believed that the sphincter remained closed for from four to eight hours after a meal. Serdiukov, and later Cannon,[2] thought that the sphincter was opened by acid in the stomach, and closed by acid in the duodenum. Cannon in 1907 states "It is probable that the pyloric sphincter has normally a greater or less degree of tonic contraction, with occasional relaxations". Cole[3] found in human beings that the sphincter is open for 7/10 of each gastric cycle. He states that "the pyloric valve is opened or opens". Wheelon and Thomas[4] showed by graphic means in dogs that the contraction of the sphincter followed that in the antrum, and that duodenal irritation can close it. Klein[5] observed the exposed stomachs of dogs under light anæsthesia. The pylorus was firmly contracted for only ¼ to ⅓ of the gastric cycle. Thomas[6] (1931) concludes that the sphincter prevents too rapid evacuation of food, especially if solid or undigested. He found the tone of the sphincter low on fasting, and highest during digestion. Thomas, Crider, and Mogan[7] (1934) showed that although duodenal irritation (by HCl) increased the tone of the sphincter in the fasting dog, it had little or no effect when the stomach was full. They also made the important observation that distension of the duodenum delayed evacuation, not by contracting the sphincter but by inhibiting gastric peristalsis.

Pylorectomy and pyloroplasty.—Information on the action of the sphincter has been sought by removing it. Von Mering[8] resected the sphincter in dogs and found that food left the stomach in jets as before. Cannon and Blake[9] performed pyloroplasty in cats and found that emptying was slightly more rapid than previously. Singleton[10] examined by screen and plates four patients who had had Billroth I operations a few months to five years previously for duodenal ulcer. In these subjects only about one inch of stomach had been removed, so that the resections could be termed pylorectomies. Not only was evacuation normal in rate, but in two cases it was almost impossible to tell from fluoroscopic observation that any operation had been performed. Granted that in some instances, either in animals or human beings, cicatricial contraction may have narrowed the opening considerably, it is evident that removal of the sphincter does not alter the normal manner of emptying, nor does it have much effect on the rate.

Anatomy.—On an x-ray film of a normal human stomach the sphincter is seen as a thin partition between the stomach and duodenum. This is quite unlike the thick anatomical sphincter as seen in the dissecting room. If one opens the stomach of a dog under deep anæsthesia and passes a finger to the region of the sphincter, a thin obstruction is encountered, with a central

*Read before the Section of Gastro-Enterology and Proctology at the combined meeting of the American Medical Association and the Canadian Medical Association at Atlantic City, June, 1935.

lumen which admits the tip of the finger. On cutting through the wall, however, the thin partition collapses, and looks much like the folds of mucous membrane in its neighbourhood.

The form of the sphincter during life, as shown by the x-ray film and by the anæsthetized dog, can be reproduced almost exactly in the autopsy room by suitable measures (Fig. 1). The stomach

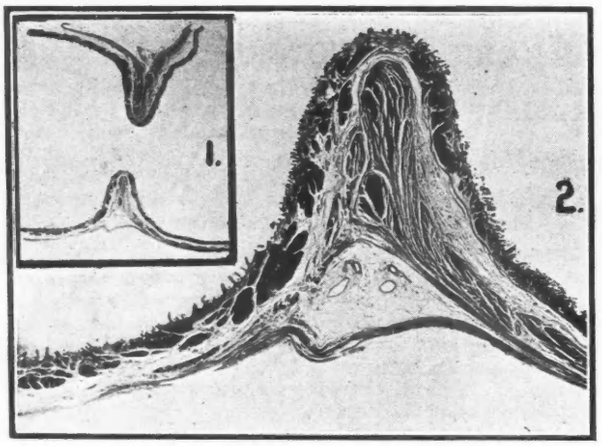

Fig. 1.—Section through human pylorus.

Fig. 2.—Human pylorus, magnified proportionately five times.

must be slightly distended with weak (3 per cent) formalin solution for 48 hours, preferably suspended in a bath of weak formalin. In this preparation the sphincter stands out as a thin ring with a central lumen. The latter varies from 1 to 15 millimetres in diameter, depending on the degree of distension and other factors. On histological examination of these specimens (Fig. 2), the mucosa and submucosa are seen distinctly, but the striking feature is that the main mass of tissue in the sphincter is circular muscle, here cut transversely. There is no heaping up of muscle outside the ring, so that all the muscle of the sphincter is here, and yet the thickness of a number of such sphincters is only 3 to 7 millimetres.

Methods and results.—Owing to the difficulties in placing balloons accurately in human subjects, animal experimentation is necessary for more precise investigation. In 1922, under the direction of J. J. R. MacLeod and N. B. Taylor, I repeated the experiments of Wheelon and Thomas on some fifty dogs. The conclusions of these authors in regard to the rhythmicity of the sphincter and its dependence on antral activity were fully confirmed. The sphincter records, however, showed gastric and duodenal influences, because the sphincter chamber of the enterograph was much longer than the sphincter itself. A further study of the records of Wheelon and Thomas showed that they had had the same difficulties, and this criticism applies also to some more recent contributions. Careful measurements of stomachs, both human and dog, and comparison with x-ray films of human stomachs, showed the sphincter to be about 5 mm. in length. A new enterograph was con-

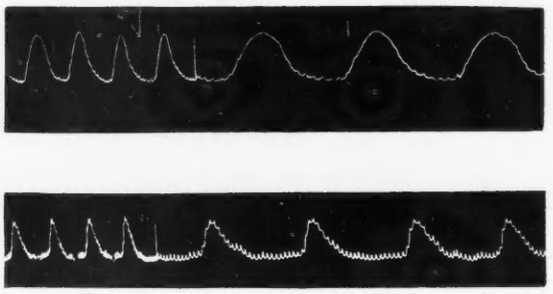

Fig. 3.—Pyloric contractions of 2 dogs, using special enterograph. In each tracing the contractions are approximately 17 seconds apart.

structed with a chamber 6 mm. long, and Fig. 3 shows tracings obtained with this instrument. These records are believed to give a true representation of the activities of the sphincter, under the experimental conditions.

The shape of the curve is constant, indicating a rapid contraction and a slower relaxation. The most important observation, however, is that the sphincter is strongly contracted for approximately ⅓ of each cycle, and relaxed for the remainder. Put the other way, the sphincter is usually relaxed, and contracts only when a peristaltic wave reaches it from the antrum. To adopt the language of the early investigators and of the textbooks, the sphincter is normally "open", and is "closed" only for short periods.

This confirms Cole's statement that the sphincter is relaxed for approximately 7/10 of each gastric cycle. Further confirmation has been obtained by means of rapid x-ray films of a normal human stomach. After some practice, a team of medical students succeeded in taking 20 plates in 30 and 2/5th seconds, the casettes being changed by hand. During this period two peristaltic waves arrived at the sphincter. Barium could be clearly distinguished in the lumen of the sphincter in every plate except when the waves reached it. In each case three plates showed no barium in the lumen. This indicates that in this particular subject the sphincter is strongly contracted for approximately five seconds in each cycle.

The tonus of the sphincter.—The relaxation between contractions is, however, only relative. The sphincter maintains a certain tonus during gastric evacuation. Attempts to measure this tension have not been very successful. In all the present experiments records were taken at frequent intervals with varying pressures in the water manometer. The pressures varied from zero to 20 cm. water, and in general the higher the pressure, the higher the contraction recorded. With an absolutely relaxed balloon, however, definite contractions with sharp ascents and slower descents were obtained with pressures of only 1 or 2 cm. water. It seems likely that the tonus is low. The actual lumen during life, as measured on many x-ray films, varies from 1 to 5 mm. In the post-mortem room specimens described above, which were distended with formalin solution under slight pressure, the lumen varied from 1 to 15 mm. in diameter.

The slight tension of the sphincter probably tends to prevent regurgitation of duodenal contents into the stomach. This was suggested, doubtless on anatomical grounds, by Leonardo da Vinci[11] about 1500 A.D. On the other hand, Bartholin[12] in 1686 concluded that the pyloric valve was "rarely closed so tightly but that fæces and bile and other things may sometimes ascend". The strong contraction of the sphincter will prevent regurgitation for a few seconds until the duodenum has accustomed itself to the volume of chyme forced into it by the peristaltic wave of the stomach, or has passed it on to the jejunum.

Conditions affecting the sphincter.—The sphincter is influenced by stimuli arising in many parts of the body. An impulse from any sensory nerve may affect it, but conditions of the gall-bladder, kidney, or appendix are common sources. The late W. H. Dickson used to tell of a ward patient who was brought to him for a barium meal. For over an hour no barium passed the sphincter, nor could it be forced through by pressure. Finally, an excited house surgeon arrived and asked if this patient had been seen, as he was wanted in the operating room for the removal of his acutely inflamed appendix.

Perhaps the most frequent cause of sphincteric contraction is irritation of the duodenum. Rossbach gave his dogs morphine, then opened the abdomen and slit up the duodenum. He found the pyloric sphincter so tightly contracted that for hours he could not force his finger through it. Luckhardt, Phillips, and Carlson[13] showed that irritating the duodenum mechanically through a duodenostomy resulted in tight closure of the sphincter.

The rôle of the sphincter in gastric emptying.—The best available evidence leads to the conclusion that the pyloric sphincter normally plays a passive part in gastric evacuation. The rate of emptying depends on the consistency of the food and on the vigour of the peristaltic waves[14]. The slow progress of fats is associated with decreased peristalsis,[14] and distension of the duodenum has the same effect.[7] It is true that abnormal stimuli *can* contract the sphincter and delay emptying, but in health these play no part. The fact that pylorectomy and pyloroplasty have little effect on the manner or rate of evacuation lends strong support to this view.

CONCLUSIONS

1. The pyloric sphincter is normally "open", that is, it is strongly contracted only when a gastric peristaltic wave reaches it.
2. The strongly contracted state lasts approximately ⅓ of each gastric cycle.
3. The tension of the sphincter between contractions is probably low, but can be influenced by stimuli from the duodenum and elsewhere.
4. Normally the sphincter plays a passive part in gastric evacuation.
5. By suitable methods of fixation, the x-ray picture of the sphincter can be duplicated, and it can be shown that all the muscle of the sphincter is in the thin "pyloric valve".

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NEPHRITIC LIPÆMIA*

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THE appearance of a milky serum has been recognized for many years as of frequent occurrence in nephritis. The phenomenon was described by Bright as early as 1827 and was enlarged upon by Christison in 1839. The further study of the nature of this lactescent serum necessarily awaited the development of methods for the determination of blood lipids, so that little more was learned until after 1910. From then on a gradually increasing and informative literature has arisen upon this subject. Blood cholesterol has received the greatest amount of attention, and amongst the many authors who have contributed information bearing on this substance in nephritis may be mentioned Epstein, Myers, Bruger, and Maxwell. From this work it has been learned that blood cholesterol varies in value according to the stage and type of nephritis. Acute hæmorrhagic nephritis may show either a high, normal or low cholesterol value, depending upon secondary factors such as fever. Chronic nephritis, especially where œdema is a symptom, is associated with rising cholesterol values until the onset of uræmia, when blood cholesterol falls as urea increases. Cholesterol is especially high in nephrosis and amyloid kidney. These changes occur in children as well as in adults.

Satisfactory methods for estimating other blood lipids were not established until some years after the cholesterol methods. Hence the literature on these is meagre. Amongst the earliest attempts at a complete lipid analysis was that of Bloor in 1917.[3] Bloor examined some two dozen cases designated as "severe nephritis" and found an increase in plasma total fatty acids and in the "lecithin" content of the red blood cells, the remaining lipid values being normal. In the same year Bloor and Knudson[5] found the ratio, ester cholesterol/total cholesterol, low in the plasma of nephritis. Taken together, these results indicate a high plasma neutral fat and a low plasma ester cholesterol and increased free cholesterol, which combination will be described below as amongst the characteristics of the early lipæmia of nephritis. Subsequent investigations revealed slightly different findings which, in view of the present work, appear to have been largely due to analyzing blood at different stages in the development of the lipæmia of nephritis. Nephrosis, or the nephrotic stage of chronic nephritis, has been noted to be associated with an increase in total fatty acids, cholesterol and phospholipids,[9, 11, 13, 14, 16, 17, 22] the increased fatty acids being of a more saturated type than normal,[16] and in the case of cholesterol at least the increase occurred in both the red blood cells and plasma. Hoesch[12] has noted an increase in the phosphatides in arteriosclerotic Bright's disease while Lichtenstein and Epstein[15] and Page, Kirk and Van Slyke[23] reported high plasma lipids in chronic glomerular nephritis. Blood cephalin has been found normal in nephritis by Nakamura[20] while lipid amino nitrogen (chiefly cephalin) was found elevated in chronic hæmorrhagic nephritis by Page, Kirk and Van Slyke,[23] and in nephrosis by Page and Farr.[22]

In the present investigation an attempt was made to study the relation of the several lipids of plasma and of the red blood cells to increasing lipæmia in chronic nephritis. Cases of acute, subacute, and terminal nephritis have not been included. Most of the patients gave a history, often indefinite, of what was probably a previous attack of acute nephritis some years

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previously. They exhibited all or most of the following: moderate hypertension, œdema, albuminuria, urine of relatively fixed specific gravity, casts of varying types, subnormal urea clearance (Van Slyke), occasionally subnormal phenolphthalein excretion, no marked retention of nitrogenous substances in blood, although these were often above normal values. Plasma proteins were low in a few associated with marked œdema and albuminuria (nephrotic type), and these tended to have higher plasma lipid values. A sample of oxalated blood was centrifuged and extracts made of plasma and of the red blood cells. These extracts were analyzed for their lipid content by the author's modification of Bloor's oxidative microtechnique.[6]

In this procedure the values determined experimentally are total fatty acids, phospholipids, total cholesterol, and free cholesterol. From these may be calculated the total lipid, neutral fats, phospholipid fatty acids, cholesterol ester fatty acids, neutral fat fatty acids, ester cholesterol and cholesterol esters. Actually, blood contains three (or four, if one regards the cholesterol fractions separately) groups of lipids, the neutral fats, phospholipids, cholesterol esters and free cholesterol. The neutral fats include the residual fatty acids which are probably present for the most part as triglycerides. Lipid values other than these three (or four) are purely convenient laboratory values, and considerable simplicity would be introduced into this subject if they were not reported as such. For this reason in Charts 1 and 2 have been depicted only neutral fats, phospholipids, cholesterol esters and free cholesterol. They have been grouped according to the plasma total lipid values so as to show the part played by each lipid in the development of increasing lipæmia amongst the cases studied. To the left of each figure has been added the normal range found in a previous communication,[7] the top of the lower shaded portion indicating the mean minus the standard deviation, the top bar the mean plus the standard deviation, and the middle bar the average normal value. The range thus given may be said to include two-thirds of normal adults.

Presented in this manner, the relative part played by each lipid in the production of increasing lipæmia in chronic nephritis may be readily visualized. First of all in comparing Chart 1 with Chart 2 the differences in the lipid composition of plasma and the red blood cells will be noted and the fact that nephritic lipæmia is due entirely to an increase in plasma lipids. It may be seen that normally cholesterol esters form the most abundant lipid fraction in plasma, followed closely by phospholipid and neutral fats, with free cholesterol present in the smallest concentration. On the other hand the bulk of the lipids present in the red blood cells

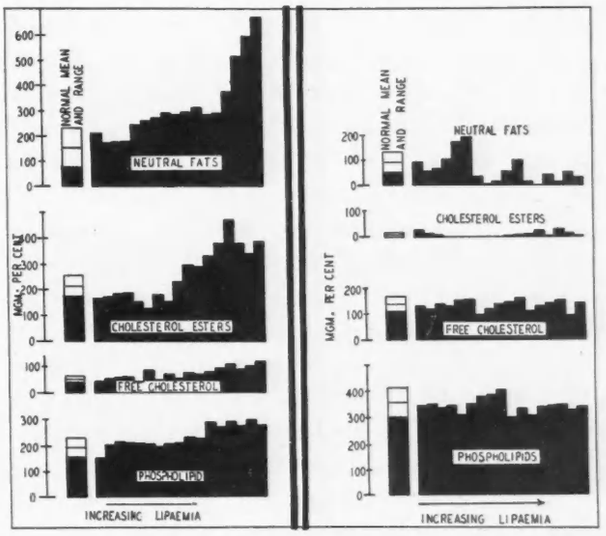

Chart 1 Chart 2

Chart 1.—The relation of the several plasma lipids to increasing lipæmia in chronic nephritis. **Chart 2.**—The relation of the lipids of the red blood cells to increasing lipæmia in chronic nephritis.

is phospholipid, next, free cholesterol, then variable but usually small amounts of neutral fat, and finally little or no cholesterol esters.

A moderate lipæmia (*i.e.*, a plasma total lipid up to about 800 mg. per cent) may be seen to be accounted for by plasma neutral fat values all above the normal range, values for free cholesterol and phospholipid within the high range of normals or above it, and *low*, even subnormal, values for cholesterol esters. This initial lipopenic change in plasma cholesterol esters has apparently been frequently missed or overlooked. As noted above, Bloor and Knudson[5] found the same in nephritis; Gardner and Gainsborough[10] noted a decrease in plasma cholesterol esters in the development of the early lipæmia of pregnancy in women while Boyd and Fellows[8] found plasma cholesterol esters decreased throughout pregnancy in guinea pigs, although the other plasma lipids increased to a very marked extent. The cause of this peculiar change in cholesterol esters is unknown.

The most marked lipæmias were encountered in those patients who were in the nephrotic stage when the plasma total lipid rose to 1,500 mg. per cent or more. At this stage the lipæmia may be seen to be due chiefly to an increase of several fold in plasma neutral fat, the next greatest increase being in cholesterol esters, then free cholesterol, and, finally, the least change occurring with phospholipid. In the lipæmias of diabetes and repeated bleeding, Bloor[4] found the greatest change to be an increase in plasma neutral fat, but in his work cholesterol increased at a slower rate than phospholipid. It is possible that the difference from the present findings may have been due to a relative decrease in cholesterol esters in Bloor's work, since he determined only total cholesterol.

In spite of these considerable changes in plasma there was no marked alteration in the lipid composition of the red blood cells at any time. Phospholipid and free cholesterol, the two main lipids, may be seen to have remained unchanged, and at no time were there significant amount of cholesterol esters. Neutral fats would seem to have been somewhat lower at the height of the lipæmia, but there was so much variation even amongst the normal values that it is doubtful if this was significant. In concluding that the red blood cells take no part in the production of a nephritic lipæmia, the present results are in agreement with previous findings in the lipæmia of pregnancy in women[7] and guinea pigs.[8]

An increased concentration of lipids in plasma may be due either to retarded removal by the tissues of lipids entering the plasma from the digestive tract or to an alteration in the normal equilibrium existing between the concentration of lipids in plasma and those in the tissues, thereby permitting of a diffusion of lipids from the tissues to plasma producing a lipæmia. Further, when the concentration of one lipid in plasma becomes increased much beyond the normal the remaining lipids appear to invariably follow suit. Neutral fats are the lipids increased first and to the greatest extent in all lipæmias which have been thoroughly studied. In searching for the cause of any lipæmia, therefore, one would be well advised to search for the cause of increase in plasma neutral fat. The main lipid in food is neutral fat and the chief lipid of the storage tissues is neutral fat. Thus in the first type of lipæmia, that of an alimentary origin, the lipid first increased in plasma is neutral fat which has been derived from digestion and absorption of fatty foods. Again, when lipids are mobilized into blood from the tissues the chief material available is neutral fat from the fat depots. When any extensive increase occurs in plasma neutral fat an increase in the other lipids gradually begins. The reason for this is not clear, although one can readily visualize a situation in which an increased number of oily particles suspended in an aqueous medium would tend to draw phospholipid and cholesterol across an animal membrane. The effect of the simultaneous increase in all plasma lipids is probably to make them all more "soluble" in plasma. It may be likened to what occurs in the organic solvents; for example, phospholipids are normally precipitated by acetone, but if other fatty materials be present the phospholipids may be partially held in solution.

There is no evidence as to the cause of the initial increase in plasma neutral fat in nephritis, but several investigators have attempted to determine whether the lipæmia is of alimentary origin or due to what we may term a disturbed plasma-tissues equilibrium. Hiller, *et al.*[11] showed that a fatty meal produced a greater increase in the plasma total fatty acids and phospholipids of patients with nephritis than of normal persons, while Wichert *et al.*[25] found an increase in cholesterol under somewhat similar conditions, the latter finding being confirmed in the uranium nephritis of rabbits by Mauriac and Servantie.[18] On the other hand, Stasiak[24] found that a diet low in fat did not lower blood cholesterol in nephritis produced in dogs by uranium nitrate, corrosive sublimate or cantharidin, and Page and Farr[22] confirmed this in man, finding no relation between high and low fat diets and lipæmia in nephrosis. At first sight, these results appear contradictory, but there is an important difference in the experimental procedure between them. The first group found that a fatty meal produced a greater-than-normal lipæmia; the second group waited overnight before drawing blood, and found that the effect of the fatty meal or meals had entirely worn off. Considering these results together, it would appear that a nephritic is not capable of immediately assimilating fats from plasma after a fat meal, but that in the

course of a number of hours (overnight) the alimentary lipæmia has been entirely taken care of. This might well be compared to the blood sugar "lag" curve seen in glucose tolerance tests in early diabetes. With a very marked lipæmia, lipids may "spill over" into the urine and produce a lipuria.

Since the persistent lipæmia of nephritis is not lowered by a low fat diet, there must necessarily be some disturbance in the second factor, the plasma-tissue equilibrium. All evidence points to the kidney as the origin of this second factor. Thus, renal disease has been produced experimentally in animals by the use of uranium salts (for example, the nitrate and acetate, phosphorus, mercury bichloride, and cantharidin, and a lipæmia occurs in these experiments, as also in double nephrectomy in animals. Apparently the damaged kidney is unable to exert some control which it normally has over the equilibrium between the concentration of lipids in plasma and the tissues. In Bright's disease various secondary factors such as albuminuria, œdema, diet, blood pressure, blood nitrogenous substances, age, blood lipase, etc., have in general been found to bear no relation to the lipæmia, apart from their relation to the severity of renal damage.

While there is no definite evidence of why renal damage should permit of a lipæmia, two interesting papers bearing on this point have recently appeared. Achard *et al.*[1] found, in 1932, that there was more cholesterol and fat in blood entering the kidney by the renal artery than in blood leaving the kidney by the renal vein. Miyazaki,[19] in 1934, injected 2 c.c. per kilo of renal venous blood from a normal rabbit into another rabbit and caused thereby a fall in blood cholesterol of the second rabbit in 3 to 5 hours. Similar control injections of arterial or auricular venous blood had no effect. He concluded that renal epithelium secretes a hormone which lowers blood cholesterol and suggested that the lipæmia of nephritis may be due to the failure of the damaged renal tissue to produce sufficient of this hormone. These interesting experiments require confirmation and more extended study, to include lipids other than cholesterol and also the effects of venous blood from damaged kidneys.

Apart from the cause of nephritic lipæmia, the *clinical significance* of blood lipid values in this disease requires some attention. The literature on this subject dates back to the work of Chauffard, Laroche and Grigaut in 1911; it has been reviewed excellently by Ashe and Bruger[2] who also have extended and analyzed the relationship more especially in regard to cholesterol. They found that there is an approximate inverse relationship between values for blood cholesterol and blood urea, especially in uræmia or impending uræmia, in which a falling cholesterol is of serious prognostic import. The fall in cholesterol with a marked rise in urea is apparently an attempt on the part of the body to maintain normal osmotic balance in the plasma, since feeding large doses of urea to normal persons also produced a fall in the blood cholesterol as the blood urea rose. They state that it may also be due to cachexia or anæmia both of which, independently of renal damage, may lower blood cholesterol.

Comparatively little is known as to what may be the *effect on body metabolism* of a persistent lipæmia such as occurs in nephritis. A good deal has recently been written about the relation of persistent lipæmia to the development of atherosclerosis, and this work has been reviewed by Page and Bernhard.[21] In the first place, atherosclerosis is common in those conditions in which there occurs a persistent lipæmia, *i.e.*, diabetes mellitus, nephritis, etc., and it has been claimed that this is due to the infiltration of the wall of the aorta at points of greatest pressure by plasma with a high lipid content, the lipids being then deposited there. In support of this view is the fact that lipids found in atheromatous plaques resemble plasma lipids and that feeding large amounts of cholesterol in oil to animals produces a lipæmia and also atherosclerosis. If thyroid substance, thyroxin, or iodides be simultaneously fed along with the cholesterol in oil atherosclerosis does not develop, and thyroid substance and thyroxin are known to lower blood lipid values. Page and Bernhard[21] found, however, that iodides in the form of the di-iodide of ricinsterolic acid not only did not lower the lipæmia produced by cholesterol in oil fed to rabbits but actually increased it. Yet these latter animals did not develop atherosclerosis as did the controls fed cholesterol in oil without the di-iodide of ricinsterolic acid. They concluded that in addition to lipæmia and high blood pressure, atherosclerosis

results only if there be some local tissue damage, suggesting that this explains the focal nature of atheroma. These experiments also lend support to the therapeutic use of iodides in nephritis and in other conditions in which atherosclerosis is common, since iodides appear (experimentally at least) to have the property of preventing this local tissue damage which permits the deposition of lipids in the wall of the aorta, thus forming atheromatous plaques.

SUMMARY

The lipid composition of blood plasma and of the red blood cells was determined by oxidative micromethods in a group of cases of chronic nephritis. It was found that increasing lipæmia in this disease was due to an increase in plasma lipids only, as no significant change occurred in the concentration of lipids in the red blood cells at any time. In plasma the most extensive increase occurred with neutral fats, next cholesterol and cholesterol esters, and the least change was found in plasma phospholipid. In moderate or early lipæmia, cholesterol esters were actually decreased in value. The cause, significance, and effect of this lipæmia have been discussed together with therapeutic applications.

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THE CURABILITY OF CARCINOMA OF THE STOMACH*

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FOR those members of the medical profession whose work is such that only an occasional case of carcinoma of the stomach is encountered there is uncertainty as to operability and curability of the disease. Among others, in whose experience the disease usually has been well advanced when recognized and inoperability has been great, an attitude has developed that carcinoma of the stomach is a fatal disease. Since 1932, when the annual symposium on the curability of cancer was established by the American College of Surgeons, interest has been aroused, and much data have accumulated regarding the curability of malignant disease which provide reason for a greater degree of optimism than heretofore has existed. It is quite true even today that carcinoma of the stomach is well advanced in the majority of cases at the time the diagnosis is established, that the clinical inoperability remains high, and that the operability in terms of resection of the new growth has not been great. However, it does not necessarily follow that this will remain true. Two unequivocal statements may be made about carcinoma of the stomach. First, the early

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diagnosis of carcinoma and the diagnosis of early carcinoma of the stomach are possible only through competent roentgenological examination. Second, only through surgical extirpation of the gastric lesion may the patient be afforded the prospect and possibility of cure.

The present status of operability of carcinoma of the stomach is about as follows. In approximately 50 per cent of the patients the disease is clinically inoperable at the time the diagnosis is established. Clinical inoperability in these cases may be manifested by ascites, fixation of a large palpable mass, jaundice, or definitely palpable metastatic involvement of the liver, metastatic involvement of the sentinel lymph node in the left supraclavicular area, infiltration of the umbilicus, involvement of the pelvic peritoneum, which exhibits to digital examination an irregular, firm, nodular rectal shelf, and finally extensive involvement of the stomach roentgenologically. Those cases in which there are no clinical manifestations definitely pointing to inoperability and are accepted by the surgeon for exploration comprise the group in which the hope of a curative resection may be entertained. However, the percentage of operability in this group is not high. In the experience of many surgeons it varies from 16 to 47 per cent of the cases. In my own experience for some years operability in terms of resection in the cases surgically explored has been 36 per cent, with little or no tendency toward an increase in this operability. I have reviewed the surgical findings in 100 cases of carcinoma of the stomach which I found to be inoperable at the time of surgical exploration. In 43 per cent of these cases, so far as the stomach was concerned, the lesion was entirely operable and resectable, but metastases to the liver, extensive involvement of the lymph nodes along the lesser curvature of the stomach or along the gastro-hepatic omentum to the hilus of the liver, or multiple remote peritoneal transplants precluded the possibility of resection. In the remainder of the cases extensive involvement of the stomach primarily, with or without direct invasion of contiguous structures—the pancreas, the liver, the transverse mesocolon or the transverse colon, with or without extensive regional glandular involvement—precluded doing a resection or even the possibility of any palliative procedure. It is only with the full knowledge of the causes of such high inoperability and the realization that today the possibility of cure may be extended to only approximately 20 per cent of patients with cancer of the stomach that the opportunity may be given a greater number of patients to avail themselves of the possibility of a cure of this disease. Under favourable circumstances carcinoma of the stomach is a curable disease in many instances. The results of partial gastrectomy for strictly operable carcinoma without glandular involvement or extension beyond its original site have been most gratifying. Optimism is engendered and encouragement to a vigorous campaign to increase the operability of carcinoma of the stomach is provided by the recorded results of many surgeons. Persson, of Stockholm, nearly ten years ago reported that 19 per cent of the patients with carcinoma of the stomach surviving resection lived five years or more. St. John has stated that 21 per cent of all patients surviving resection were alive and well after the five-year period. Gatewood, in 1932, stated that 46 per cent of patients who survived the operation of partial gastrectomy lived more than three years, and that 39 per cent survived for more than five years. Balfour, in an analysis of 128 patients who lived ten years or more following operation, said that they represented about 20 per cent of the patients in whom resection could be carried out.

Carcinoma in its various situations in the stomach differs greatly in its clinical manifestations and in its curability. There is no clinical syndrome by which early carcinoma of the stomach may be recognized, and not infrequently the disease is well advanced before noteworthy clinical signs occur. Also, there are certain lesions which by virtue of their location are inoperable from the time of their inception. Malignant lesions high in the fundus and those encroaching on the cardia of the stomach are seldom operable, chiefly because of the absence of early symptoms, the extensiveness of involvement, and the inaccessibility to surgical procedures. Gatewood has stated that in approximately 15 per cent of the cases of carcinoma of the stomach the new growth is situated at or near the cardia. Practically all carcinomas of the stomach, except those situated high in the fundus or at the cardia, are operable for variable periods of time following their inception, and it is in these

cases that the opportunity exists to increase the percentage of operability and curability. Theoretically, it would seem—and in the absence of regional glandular involvement it is true—that lesions just proximal to and encroaching upon the pylorus are the most favourable for resection and provide excellent prospect of cure. Experience has shown that when regional glands are involved greater opportunity exists for their removal when such involvement is due to a lesion located in the body of the stomach rather than when it is due to a lesion situated in the antrum of the stomach or one which extends to the pylorus. The involved glandular structures secondary to a lesion of the body of the stomach lie along the lesser curvature, and lend themselves to removal to a level as high as the cardia, if need be, while the glandular involvement of a lesion of the antrum of the stomach extends along the free edge of the gastrohepatic omentum to the hilus of the liver, tends to infiltrate contiguous important structures, and seldom can be removed completely. It is well known that the curability of carcinoma of the stomach, as of carcinoma elsewhere, is largely dependent upon the absence or presence of regional glandular involvement, and many times in the course of a surgical exploration the operability of a malignant lesion of the stomach turns abruptly on the degree of glandular involvement, the particular group of glands involved, and the surgical accessibility of those glands. While the prospects of cure of the disease following partial gastrectomy are not so great in the presence of regional glandular involvement as in the absence of such extragastric extension of the disease, most gratifying results are not infrequently observed when the involved glands are situated so as to facilitate their complete removal coincident with partial gastrectomy. That regional lymphatic glandular involvement enters into consideration in the execution of the operation of partial gastrectomy, curative in purpose, is shown in a review of 56 cases in which I have performed the operation for operable carcinoma of the stomach during recent years. In 31 of these cases, or 55 per cent, regional lymphatic glandular involvement was present in varying degree, from only one lymph node to involvement of the entire group of glands localized along the lesser curvature of the stomach.

LATE DIAGNOSIS

The foregoing, as well as the experience of others, indicates conclusively that even though methods of doing so are available the diagnosis of carcinoma of the stomach is not made early in the course of the disease. As an actual fact, the diagnosis is made so late in the course of the disease that, generally speaking, in less than 20 per cent of the cases is the carcinoma resectable when the diagnosis is established. Many factors are herein concerned. It is true that in many instances the disease is well advanced before the patient consults his physician. It is also true that the patient oftentimes has resorted to self-medication from the beginning of any digestive disturbance, and through his own failure to seek competent counsel has allowed what was an operable lesion to become an inoperable one. The layman's outlook of futility in regard to cancer is responsible in some instances for his delay in having his suspicion allayed or confirmed. In other words, he still wishes to avoid the issue. Too frequently the alert patient, who is desirous of seeking aid and advice regarding clinical manifestations which may be due to early gastric carcinoma, is not the recipient of careful consideration on the part of the physician. Failure to recognize the fact that there is nothing distinctive about the clinical manifestations of early gastric carcinoma and that primary carcinoma, when present, is often productive of digestive disturbances of seemingly minor importance too frequently allows the busy physician to make but a superficial or cursory examination, if at all, and to engage in a program of symptomatic treatment. It has been said that carcinoma of the stomach may become well advanced entirely without symptoms. Such a statement is subject to much question. It is true that symptoms may not be of sufficient severity to occasion great concern before the clinical signs of a large, fixed mass, gastric retention, marked loss of weight, and so forth, which denote advanced disease are manifested, but nevertheless bizarre symptoms usually are present. A striking observation in the study of a large group of cases was the fact that in the majority of patients digestive symptoms had been present for a year or more previous to the time the diagnosis of carcinoma of the stomach was established. A lesion of the stomach, whether it is benign or malignant, is not symptomless long after its inception.

The roentgenologist has established beyond question the fact that only through roentgenological examination may the diagnosis of carcinoma of the stomach be established early. It is true that the value of the roentgenological data depends on the skill, experience, and judgment of the roentgenologist. The depiction on the fluoroscopic screen or on the x-ray film of an intragastric lesion is an important factor, but the proper interpretation of what is seen is often difficult. In the differential diagnosis of intragastric lesions as they are seen by the roentgenologist, it is necessary to distinguish between cancer, syphilis, benign tumour and ulcer. The clinician may provide data which will aid materially in the diagnosis of gastric syphilis. Many roentgenologists can differentiate between benign tumour and carcinoma, but few, if any, are always able to differentiate between benign gastric ulcer and early carcinoma. To distinguish a benign ulcer from a malignant ulcer offers the greatest difficulty, and the occasion for such distinction often arises. It has been suggested, and has been the practice of some, when there is doubt regarding the nature of an intragastric lesion —which may be a benign or a malignant ulcer— that the patient be submitted to a course of medical treatment, a therapeutic test, in other words, and if relief is obtained and there is recession of the lesion roentgenologically it may be assumed that the lesion is benign. This policy has little to commend it for general adoption. It is well known that clinically a patient with an early carcinoma of the stomach may respond temporarily to medical management. Further, few roentgenologists are sufficiently experienced in such periodic observations to reliably interpret roentgenological changes over a period of time, and such delay may allow an operable lesion to become inoperable. As a surgeon who has explored a number of patients on whom the therapeutic test has been employed, I strongly condemn such delay in operating upon a lesion about which there is doubt regarding its benignancy. I should emphasize also the fact that in the last analysis the differential diagnosis in many instances is possible only after the study of sections by a competent pathologist.

Frequently carcinoma of the stomach is not given serious consideration until a mass is palpable in the upper abdomen, gastric retention has occurred, or other major signs of a serious disturbance have become evident. The prospect for improvement in diagnosis of malignant gastric disease depends upon a more widespread suspicion of its possible existence, even though the symptoms are entirely bizarre, a mass is not palpable, and gastric retention has not occurred. Promptness and thoroughness in making a careful examination, including competent roentgenological investigation of the gastro-intestinal tract, will reveal early operable carcinoma more frequently than heretofore, and will materially enhance the possibility of cure.

SURGICAL CONSIDERATIONS

Once the diagnosis of carcinoma has been established and no clinical evidence of remote or metastatic extension of the disease is discernable, surgical exploration promptly becomes urgent. The institution of certain preoperative measures has contributed materially during recent years to the safety of surgical procedures in carcinoma of the stomach. Preoperative gastric lavage for a period of several days for gastric retention, replenishing the body fluids when the patient is dehydrated, and transfusions of blood in the anæmic patient have reduced the risk of surgical exploration to a negligible level, and have facilitated gastric resection and palliative operations within a legitimate mortality rate. The extent of gastric involvement, as demonstrated by the roentgenologist, may deter the surgeon in deciding to explore a patient in whom the indications for exploration are otherwise clear. Under these circumstances one's own experience must serve as the guide to aid him in making the decision regarding the advisability of surgical exploration. It must be borne in mind that at times a growth with rather high involvement of the stomach along the lesser curvature, as depicted on the fluoroscopic screen or in the roentgenogram, is found upon exploration to be confined entirely to the stomach and is resectable. This justifies surgical exploration when operability may be doubtful or questionable from the roentgenological viewpoint. Partial gastrectomy is seldom justified in the presence of metastases in the liver or elsewhere in the abdomen beyond the removable regional

lymph nodes. Even though resection may be undertaken occasionally with the realization that not all of the involved regional nodes can be removed, such a procedure must be regarded simply as a palliative one and not as curative. So far as a curative partial gastrectomy is concerned, the immediate and ultimate outlook is most favourable in those cases in which the lesion is confined to the antrum or pyloric portion of the stomach, without glandular involvement, in which resection of the pyloric half of the stomach facilitates wide removal of the lesion. Although the regional lymph nodes are enlarged, it is often difficult for the surgeon to determine whether such lymphatic glandular enlargement is the result of invasion by cancer or whether the glands are entirely inflammatory. Enlarged and entirely removable regional glands should not permit the surgeon to deny the patient the advantages of partial gastrectomy for an otherwise resectable growth. There are other factors which should not always influence the surgeon against resection if conditions are otherwise satisfactory. One of these—and one of considerable importance—is moderate fixation of the growth posteriorly to the pancreas. Not infrequently such attachment is the result of inflammatory reaction and not of malignant invasion of the capsule of the pancreas, and mobilization of the stomach may often be effected, facilitating resection with complete removal of the disease.

The risk of operation should always influence the surgeon in determining the magnitude of the resection which is necessary to completely remove the lesion and restore gastro-intestinal continuity. The magnitude of partial gastrectomy and its attendant risk vary greatly with the location and size of the lesion. The surgeon cannot be unmindful of the risk and surgical mortality. Experience has shown that with modern methods of pre-operative rehabilitation of patients with carcinoma of the stomach, partial gastric resection may be accomplished in the strictly operable cases with a surgical mortality within approximately 10 per cent. In following a rather dogmatic rule, I have long questioned whether a surgical mortality rate for radical curative procedures for malignant disease in excess of the percentage prospect of cure was justifiable. In 48 cases of the series of gastric resections previously referred to the carcinoma was confined to the lower part of the stomach, was strictly operable, and a wide resection of the growth was accomplished by partial gastrectomy, removing the distal half or three-fifths of the stomach, with four deaths in the hospital. In my own experience the risk of partial gastrectomy for malignant disease rises rapidly when the recognized limits of operability are unduly extended and the resection is carried into the cardiac third of the stomach, with or without removal of all of the contiguous lesions. It is quite true that occasionally such an extensive resection seems justified. However, the extensiveness of the disease necessitating such a radical operation usually obviates the possibility of cure, and causes the surgeon through the occasional recovery of a patient from the operation to endorse with unwarranted enthusiasm the operation of subtotal or total gastrectomy for extensive, advanced carcinoma of the stomach, even though in the performance of the procedure he contributes to his own skill in the execution of the operation.

It is my opinion that progress in the curability of carcinoma of the stomach will not occur through extending the limits of operability and the execution of more radical surgical procedures for extensive disease. However, opportunity does exist for enhancing the curability of this disease through submitting the patient to the highly perfected procedure of semi-radical partial gastrectomy, with its alternative methods of establishing gastro-intestinal continuity early after the inception of the disease when it is still closely confined as an intragastric lesion. For improvement in the present outlook in carcinoma of the stomach the patient is not dependent as much upon the surgeon as upon the physician from whom he first seeks counsel, and it is to the physician that this discussion is particularly addressed.

BIOCHEMICAL DIFFERENCES BETWEEN MICE OF TUMOUR AND NON-TUMOUR STRAIN, AND TUMOUR- AND NON-TUMOUR-BEARING MICE OF TUMOUR STRAIN*

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THAT heredity is a factor of major importance in the spontaneous development of cancer in mice is adequately demonstrated by the existence of inbred strains in which a large percentage of the individuals develop cancer and of strains in which few or none develop cancer. Büngeler[1] studied the respiration of various excised tissues of six mice bearing spontaneous carcinomas of the breast, and found a generally lower oxygen consumption and higher aerobic and anaerobic glycolysis than was characteristic of similar tissues from non-cancerous mice. Büngeler concluded that this type of metabolism was an expression of a general "tumour disposition".

The present study was undertaken in order to confirm the tumour type of metabolism observed by Büngeler, and also to determine, if possible, any other factors of what he called a "tumour disposition". The mice used in this study were furnished through the kindness of Dr. C. C. Little, of the Roscoe B. Jackson Memorial Laboratory at Bar Harbor, Me. These mice were grouped as follows:

1. Females of tumour-strain (2) bearing mammary gland tumours.
2. Females of the same tumour strain (2) not bearing tumours at the time of the experiment.
3. Males of the same tumour strain (2), none of whom were found bearing a tumour.
4. Males and females of non-tumour strain (3).

These four groups were studied as follows as to:

1. Respiration of excised tissues: tumour; liver; abdominal muscle; lymph nodes.
2. Blood determinations: hæmoglobin; red cell count; red cell volume; pH.
3. Calcium content of tissues: bones; soft parts.
4. Histopathology of tissues: tumour, liver, kidney, spleen, adrenals, thyroids, pancreas, lymph nodes.

Measurement of respiration.—All respiration measurements were made by the Warburg differential method.[4] The tissues respired in a modified Ringer's solution or cerebrospinal fluid in equilibrium with a gas mixture of 95 per cent oxygen and 5 per cent carbon dioxide. Cerebrospinal fluid was used in determining the respiration of the lymph nodes and for studying its effect as compared with the modified Ringer's solution on the respiration of tumour and liver tissue. In all other cases the liquid medium was the modified Ringer's solution.* According to the Warburg nomenclature QO_2 is used to indicate the amount of oxygen consumed, $Q\,^{O_2}_{CO_2}$ the amount of ærobic glycolysis in terms of extra carbon dioxide produced, and $Q\,^{N_2}_{CO_2}$ the amount of anærobic glycolysis in terms of carbon dioxide produced. These amounts are expressed in terms of c.mm. of gas used or produced per mg. of dried tissue per hour.

Respiration of liver, abdominal muscle and lymph nodes.—The values obtained for these tissues are shown in Table I. This Table shows that the average oxygen consumption of excised liver and abdominal muscle of the tumour-strain mice of groups 1, 2, and 3 was less than that of the non-tumour-strain mice of group 4. It also shows that the average oxygen consumption of the cervical lymph nodes of the tumour-strain mice was greater than that of the non-tumour-strain mice, possibly due to increased leucocytic mobilization. The Table further shows that the tumour-strain-mice had a relatively greater liver weight than the non-tumour-strain mice.

Respiration of tumour and liver tissue in modified Ringer's solution and cerebrospinal fluid.—This comparison was made on tumours from mice of group 1 and livers from mice of each of the 4 groups. The results of this comparison are shown in Table II. This shows that the oxygen consumption of tumour differed but little in the modified Ringer's solution and

* From the Lasker Foundation for Medical Research, the University of Chicago.

* Composition of solution: NaCl, 114 mM/L; $NaHCO_3$, 25 mM/L; KCl, 6 mM/L; Na_2HPO_4-NaH_2PO_4, 1.0 mM/L; Glucose 0.2 per cent.

TABLE I.

RESPIRATION OF TISSUES OF TUMOUR AND NON-TUMOUR MICE

Tissue	Mouse Group	Number in Group	O_2 Consumption		Weight / Total Weight	
			Average	Range	Average	Range
			cu.mm./mg./hr.	cu.mm./mg./hr.	per cent	per cent
Liver.....	1*	24	8.3	3.0 – 13.7	8.4	5.5 – 12.1
	2	11	8.6	4.9 – 9.7	6.7	5.7 – 8.0
	3	9	8.7	5.5 – 10.5	7.1	4.1 – 12.1
	4	12	10.0	8.1 – 12.2	5.7	3.7 – 7.1
Abdominal muscle	1	5	3.8	3.0 – 4.6		
	2	8	4.1	3.5 – 5.6		
	3	7	4.1	3.5 – 5.2		
	4	25	5.3	5.1 – 8.1		
Lymph nodes....	1	10	15.5	8.1 – 44.7		
	2	5	9.6	6.5 – 17.6		
	3	5	11.8	7.0 – 20.1		
	4	5	7.5	7.0 – 8.0		

*1—Females of tumour strain with tumours.
2—Females of same tumour strain without tumours.
3—Males of same tumour strain without tumours.
4—Males and females of non-tumour strain.

cerebrospinal fluid, whereas that of liver from every group was markedly greater in cerebrospinal fluid. This difference was probably due to different oxidative mechanisms, that of the tumour probably failing in some of the processes, as suggested by Elliott *et al.*[5] This Table also shows that the glycolysis of both tumour and liver was markedly less in cerebrospinal fluid, which suggests that much of the glycolysis ordinarily observed may be due in great measure to the medium used. It is also probable that the glycolysis of excised dying tissue[6] in any medium is greater than that which normally occurs before removal from the living animal.

Blood determinations.—These included determinations of hæmoglobin, red cell count and red cell volume. Hæmoglobin was determined colorimetrically[7] and plasma volume by a micrometric adaptation of the dye method.[8] This consisted of matching the colour of a drop of serum from the dye-injected mouse with standards of known dilution. Red cell volume

TABLE II.

RESPIRATION OF TUMOUR AND LIVER TISSUE IN RINGER'S SOLUTION (R.S.) AND CEREBROSPINAL FLUID (C.S.F.)

Tissue	Number of Experiments	Average Q_{O_2}		Average $Q_{CO_2}^{O_2}$		Average $Q_{CO_2}^{N_2}$	
		R.S.	C.S.F.	R.S.	C.S.F.	R.S.	C.S.F.
Tumour.....	10	15.2	14.7	6.6	4.1	24.2	14.5
Liver.....	10	8.7	12.8	1.8	0.9		

TABLE III.

BLOOD DETERMINATIONS OF TUMOUR AND NON-TUMOUR MICE

Mouse Group	Number in Group	Hæmoglobin		Red Cell Count		Red Cell Volume	
		Average	Range	Average	Range	Average	Range
		g./100 c.c.	g./100 c.c.	millions/cu.mm.	millions/cu.mm.	c.c./g. body weight	c.c./g. body weight
1*	30	7.8	3.1 – 12.5	5.2	1.9 – 7.5	0.04	0.02 – 0.08
2	17	11.9	4.1 – 15.5	6.9	1.7 – 8.8	0.06	0.03 – 0.09
3	19	8.5	2.6 – 12.9	3.9	1.4 – 5.1	0.06	0.04 – 0.07
4	15	13.6	12.0 – 15.5	8.0	5.6 – 8.6	0.04	0.04 – 0.04

*See footnote to Table I.

was estimated from plasma volume by means of the ratio obtained from hæmatocrit determinations. The results of these determinations are shown in Table III. This shows that the hæmoglobin, as also the red cell count, of the three tumour-strain groups was on the average less than that of the fourth non-tumour-strain group. White cell counts were also made but not included in the Table, because it was later found that in some cases a very high white cell count was due to including in the count nucleated red cells. There were also many such cells in the blood of the non-tumour mice, but not nearly so many as in the blood of the tumour-strain mice. Although this regeneration of red cells was marked in all three tumour-strain groups, it was sufficient in only the non-tumour-bearing mice to increase their red cell volume enough to offset their hæmoglobin deficiency. It was only the exceptional tumour-bearing mouse that compensated in this way, the average having not only a low hæmoglobin and red cell count but also a low red cell volume.

It also seemed desirable to compare the acid-base balance of the blood of the four groups of mice. Owing, however, to the difficulties experienced in drawing sufficient blood from a mouse to make all the determinations required by the Henderson-Hasselbalch equation, it was found feasible to determine only pH's on a few mice from each group. The determinations were made on blood drawn directly from the heart. The mode was 7.4 for the 3 tumour-strain groups and 7.3 for the non-tumour-strain mice.

Calcium content of the bones and soft parts.—After separating the bones and soft parts, dry ashing, and dissolving in hydrochloric acid, the calcium content of each was determined by titration with potassium permanganate.[9] The results of these determinations are shown in Table IV. This shows that the non-tumour-strain mice of group 4 had the least calcium in both soft parts and bones, that the tumour-bearing females of group 1 had the most calcium in the soft parts, and the tumour-strain males of group 3 the most calcium in the bones.

Histopathology of the tissues.—Microscopic study was made of all the tumours and of the livers and kidneys from all the mice used in this study. In many cases the cervical lymph nodes, spleen, thyroids, adrenals and pancreas were also studied. The tumours were all of the mammary gland. With the exception of the liver all the other tissues appeared essentially

TABLE IV.

COMPARISON OF CALCIUM CONTENT OF BONES AND SOFT PARTS OF TUMOUR AND NON-TUMOUR STRAIN MICE

Mouse Group	*Number in Group*	*Ratios on Basis of 100 for Non-Tumour Strain Group 4*			
		Soft Parts		*Bones*	
		Average	*Range*	*Average*	*Range*
1*	9	183	133-200	113	100-117
2	9	133	100-166	100	91-113
3	9	150	100-200	130	117-139
4	9	100	93-107	100	87-113

*See footnote to Table I.

TABLE V.

SUMMARY OF AVERAGE DETERMINATIONS OF EACH GROUP

Determinations	*Unit*	*Group 1 Females of Tumour Strain with Tumour*	*Group 2 Females of Tumour Strain without Tumour*	*Group 3 Males of Tumour Strain without Tumour*	*Group 4 Non-Tumour Strain Mice*
O_2 Consumption:	cu.mm./mg./hr.				
Abdominal muscle		3.8	4.1	4.1	5.3
Lymph nodes		15.5	9.6	11.8	7.5
Liver		8.3	8.6	8.7	10.0
Weight of liver	% of body weight	8.4	6.7	7.1	5.7
Blood:					
Hæmoglobin	g./100 c.c.	7.8	11.9	8.5	13.6
Red cell volume	c.c./g. body weight	0.04	0.06	0.06	0.04
Red cell count	millions/cu.mm.	5.2	6.9	3.9	8.0
Reaction	pH	7.4	7.4	7.4	7.3
Calcium:	ratios				
Soft parts		183	133	150	100
Bones		113	100	130	100

normal. In the liver of the tumour-strain-mice increased fatty infiltration was shown by the Scharlach R. stain. Büngeler[1] had also found that the liver of his mice with spontaneous tumours showed the most variation from normal.

CONCLUSIONS

The averages of the preceding Tables have been brought together in Table V. This shows the following differences between the tumour-strain mice of the first three groups and the non-tumour-strain mice of the fourth group:

1. There was the generally lower oxygen consumption of the tissues of the tumour-strain-mice, as had previously been observed by Büngeler.

2. In addition the following factors were possessed by the tumour-strain-mice and correlated with their oxygen deficiency: (*a*) larger liver; (*b*) lower hæmoglobin; (*c*) lower red cell count; (*d*) lower red cell volume.

3. The tumour-strain-mice also had (*a*) more calcium in their soft tissues; (*b*) a more alkaline pH. This Table also shows the following differences between the tumour-bearing and non-tumour-bearing mice of tumour-strain: (1) Those not bearing tumours showed a tendency to overcome the low hæmoglobin by an increased red-cell volume. (2) Those not bearing tumours had generally less calcium in their soft tissues.

The foregoing, and probably other factors, differentiated the tumour- and non-tumour-strains and the tumour- and non-tumour-bearing mice studied. The fact that most of the differences between the tumour- and non-tumour-strains also applied to the males and females not bearing tumours makes it seem probable that these differences were not the result, but rather predisposing factors, of tumour. Those mice of tumour-strain not bearing tumours differed from those bearing tumours chiefly in compensating for oxygen deficiency and in having less calcium in their soft parts. The males, especially, who were never found with tumours, had their excess calcium in their bones rather than in their soft parts. It would appear probable, therefore, that the presence of calcium in tissues suffering from an oxygen deficiency may have been the deciding factor as to whether a tumour would or would not result.

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INTERFERENCE WITH RADIO COMMUNICATION BY THERAPEUTIC EQUIPMENT.—H. B. Williams believes that many members of the medical profession will learn with surprise that they have been, unwittingly, responsible for broadcasting a great deal of disturbance of a particularly annoying type. The most prominent offenders in the medical armamentarium are the various medical and surgical diathermy machines, particularly the new short wave diathermy and artificial fever devices. Last winter important activities of the Naval Research Laboratory at Washington, D.C., were subjected to interference so serious as to stop the work completely. Eventually, after great trouble and expense, the disturbance was traced to therapeutic equipment. The first disturbing instrument located was a diathermy unit located in a hospital at Cambridge, Mass. This apparatus was found to have been so connected to the power supply line that the latter functioned as an antenna and enabled this small apparatus to broadcast a "sky wave" of considerable intensity. It is expected that the Council on Physical Therapy of the American Medical Association will presently alter its requirements for acceptance of electrical equipment such as is known to have caused interference. Manufacturers will be asked to submit evidence that the construction and installation specifications are such as to prevent interference. It is imperative that the medical profession and the manufacturers of electrical equipment for the profession take prompt steps to abate this nuisance, as otherwise it is certain that relief through legislation will be requested. This is liable to bring undesirable restrictions and will probably be entirely unnecessary if suitable action is initiated by the profession itself.—*J. Am. M. Ass.*, 1936, **107.**

THE TYPING OF MALIGNANCY*

(A CLINICO-PATHOLOGICAL STUDY)

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WHILE it is realized by some authorities on cancer that the term "cancer" comprises a number of distinct diseases, in actual practice this distinction is imperfectly acted on. Naturally, treatment is urgent and resolves itself into one of surgery or radiation or both; and even as to prognosis, in spite of some broad variations, the ultimate outlook appears to be much the same wherever the growth arises or whatever its histology. Despite this inevitable issue, a close observation of material from the operating room and the bedside actually reveals distinct differences through which a wider range of attack on the disease might become manifest. It seems clear, for instance, that the different grades of blood-findings denote differences in the type of malignancy peculiar to the given patient,—in that the morphological features found at one time are still recognizable at other times, so that the case might almost be identified from the blood-film alone. It has also been noticed that a case may show a three or four grade blood-change at a time when the surgical indications are those of an early lesion, and only one or two grade change when the case is clinically an advanced one. When, however, a search is made for special clinical details to correlate with the microscopic findings in blood and tissue it is the rule to find no record of signs and symptoms suggestive of a specific behaviour of the neoplasm, though actually that behaviour exists. There are often peculiarities in the mode of dissemination through the body, apart from the ordinary pathology. This may be accounted for in part by anatomical considerations, but there still remain possibilities of individuality, so that a search for specific differences in the tissues of neoplasms apart from their histological nomenclature seems desirable.

The present communication necessarily provides only an outline of the thesis that there are types of malignancy over and above the classical clinical and pathological forms. In venturing upon the conception of malignancy as in many instances a virus process, one uses the term "virus" for any type of living exogenic agent which is not already ruled out by bacteriology, so that one is open to apply that term either to one single agent common to all forms of malignancy, or to a class of many different agents (as, for instance, Borrel would do). In other words, malignancy is in the first place of two types: one in which the existence of a virus is excluded, and another in which there is the possibility of a virus (*i.e.*, an exogenic agent) at work. The second group is divided into seven types on the basis of microscopical studies; and one of these is again subdivided into five more.

The basis of grouping is not the form of the tumour cells themselves but the types of granulation and the so-called "inclusion bodies". There is of course no doubt about the existence of these structures, the only dispute is as to their being intimately related to the malignant process, to the same extent that almost precisely similar bodies in admittedly virus diseases are related to those. Their abundance in some cancerous tissues suggests that they are more significant than the cancer cells themselves, so that instead of reporting on a neoplasm as this or that form of carcinoma the types and numbers of inclusions would be taken as the essentially significant feature.

Following the method adopted when discussing inclusion bodies in the blood-cells in malignant disease,[1] it is useful to list the kinds of inclusions to which attention is being drawn, leaving aside for the moment any discussion as to their precise nature (degeneration-products, artefacts, non-specificity or specificity). Most of them appear as granulations of varying sizes from ultramicroscopic size up to 2.5 or 3 μ and

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then there is a gap till we reach the classical Plimmer-body of 12-14 μ. The types of malignancy are provisionally taken as follows:

A. Cases without evident cell-inclusions.
B. Cases with inclusion-bodies of these various forms:
I. Granular forms ("the granulation of neoplastic tissue").

	Frequency Percentage
(*a*) Extremely minute (submicroscopic).	2
(*b*) Micro-granules, usually in small vacuoles	22
(*c*) Macro-granules (1-2.5, or 3 μ) usually taken to be pycnosed nuclei, or lymphocytic fragments, etc.	14
(*d*) Both *a* and *b* present in the same specimen	18
(*e*) Packets of (usually) eight particles, sometimes within an oval deeply oxyphile sharp contoured "cell". The particles take up nuclear stain intensely (trachy and pachy-chromatic)	5
II. Blastomycetic forms (*e.g.*, the classical Plimmer bodies)	31
III. Torular forms	2
IV. Mycelial forms	1
V. Cases associated with antecedent septic infections	1
VI. Coccidial forms: (benign neoplasms)	1
VII. Protozoan forms, where plasmodial masses occur in the tumour cells	3

RELATION OF TYPE TO SITE OF PRIMARY 92 CASES

Type	*Buccal*	*Gastro-intestinal*	*Breast*	*Uterus*	*Skin*	*Sarcoma*	*Total*
I	3	5	5	9	0	3	25
I	4	0	6	2	1	1	14
I	4	5	6	1	1	3	20
II	5	11	14	2	1	0	33

To determine to which of the types a given case belongs one makes use of fresh operation material. Preparations of the tissue "milk" are made within as few minutes as possible. Some of this is examined by the dark-field method, with and without colour filters; some is used for making films. Of these some are placed immediately (before drying) into Schaudinn or Bouin fixative, and some are air-dried for Leishman staining.

Histological sections are also analyzed in due course, using both frozen and routine preparations. The granulations are then orientated upon the tumour-cell background, which itself is specially interpreted — the cells being (*a*) proper, (*b*) trophic, (*c*) exogenic—which mimic the host cells closely,[2] (*d*) free-swimming or naked "nuclei".

The blood-grade is worked out as an additional factor,[3] after which the clinical behaviour of the disease in the individual case can be taken up. This combined clinico-pathological approach explains the wide discrepancies shown in the literature in regard to laboratory data on "cancer" (*e.g.*, pH readings, glucose tolerance tests, cholesterol analyses, lactic acid determinations, etc.). It also shows how much more detailed a clinical study is to be desired, *e.g.*, make-up of patient, oxidation-reduction potential, degree of maleness or femaleness, etc. By this combined study one may seek to explain why some cases develop slowly, others in a "galloping" manner; why some cause hardly any clinical effects, while others produce marked changes; why some growths apparently identical in structure should disseminate in different directions; why the blood should show inclusion bodies at an extremely early stage as well as long after the growth has been excised.

To sum up, the study of tumour-juice by special cytological methods immediately after excision provides important information, especially if combined with intensive study of the blood-cell reactions. The cases may be divided up into seven or more types according to the form of the granulation present. The studies indicate (1) that this granulation is vitally significant, even more than the cancer cells *per se;* (2) that the degree of malignancy is in some sort proportional to the abundance of granulation and its type; (3) therefore the danger to the patient lies ultimately in the granulation, that is, in particles very much smaller than cells, rather than in a given histological variety of neoplasm. (This is in line with the conclusions of Besredka and Gross that the tumour tissue itself is a reaction to a virus); (4) that some of the cells in a histological preparation are not body cells at all, but foreign exogenic cells; (5) that closer study of the clinical features, after making some such typing as here suggested, may tend to give a lead towards a more exact and individual mode of therapy.

A detailed analysis of the inclusion bodies is expected to be published shortly.

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EMBOLISM AND THROMBOSIS OF THE LARGER ARTERIES: THEIR DIAGNOSIS AND TREATMENT*

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ACUTE occlusion of the larger arteries from thrombosis or embolism is not a rare occurrence. Although this vascular accident more often occurs in the lesser rather than in the greater or systemic circulation, my remarks in this discussion will be confined to acute occlusions of the larger arteries of the systemic circulation, *viz.*: aorta to popliteal, and subclavian to brachial. Until recently there has been no special form of treatment for this vascular accident.

Since the removal of an arterial embolus with return of circulation, successfully attempted by Labey[1] in 1911, a number of patients have been treated by arteriotomy and removal of the embolus. Embolectomy has now become one of the recognized forms of treatment for acute arterial occlusion due to embolism. Leriche[2] advocates arteriectomy or removal of the occluded portion of the artery rather than arteriotomy and removal of the embolus. He recommends arteriectomy for the treatment of acute arterial thrombosis as well as embolism. In 1934, two special methods of medical treatment were suggested. Denk[3] reported complete recovery in 6 out of 10 cases of acute arterial occlusion following the intravenous injection of papaverine—an antispasmodic drug. Herrmann and Reid[4] treated successfully 10 patients by alternate suction and pressure, using the Pavaex apparatus developed by Herrmann. The success of these different methods of treatment depends upon early diagnosis and prompt treatment. It may be of interest, therefore, to review briefly the diagnosis of acute arterial occlusions and to discuss the results from present methods of treatment.

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THE CAUSES OF EMBOLISM AND THROMBOSIS

The causes of acute arterial occlusion, apart from ligation, which is omitted from this discussion, are spontaneous thrombosis and embolism. In the larger arteries embolism is more common than thrombosis as a cause of acute occlusion. In our series, there were 34 cases of embolism and 14 of thrombosis. The origin of an arterial embolus in the systemic circulation is nearly always a mural thrombus in the left auricle or ventricle. The common cause of thrombus formation in the left auricle is rheumatic heart disease with mitral stenosis, or degenerative heart disease with auricular fibrillation. In the left ventricle cardiac infarction from coronary occlusion is the usual cause. Less common origins of emboli are vegetations in acute or subacute bacterial endocarditis, or a fragment of a thrombus developing in an aneurysm or on an atheromatous plaque in the aorta. Very rarely an embolus may arise from a thrombosed vein and reach the aorta through a patent foramen ovale—a paradoxical embolus.

In arterial thrombosis signs and symptoms of peripheral arteriosclerosis and myocardial disease with varying degrees of insufficiency are present, and a previous history of intermittent claudication or coldness of the feet, indicating an inadequate peripheral circulation, is not uncommon. Less common causes of thrombosis are infection and trauma. In the upper limb, a cervical rib or pressure from a crutch may be responsible. Injury to the lining of the arteries from arteriosclerotic changes, and slowing of the circulation from myocardial disease with insufficiency would seem to be the important inciting factors in the development of arterial thrombosis.

CLINICAL MANIFESTATIONS

Sudden closure of one of the larger arteries presents a characteristic clinical picture. If

TABLE I.

MEDICAL SERVICE, TORONTO GENERAL HOSPITAL
ACUTE OCCLUSION OF LARGER SYSTEMIC ARTERIES

*Primary Origin of Embolus or Thrombus**	*Embolus*	*Thrombus*	*Aorta*		*Common Iliac*		*External Iliac*		*Femoral*		*Popliteal*		*Subclavian*		*Axillary*		*Brachial*	
			E.	*T.*	*E.*	*T.*	*E.*	*T.*	*E.*	*T.*	*E.*	*T.*	*E.*	*T.*	*E.*	*T.*	*E.*	*T.*
Rheumatic heart disease with mitral stenosis...	11		4						4		1				1		1	
Degenerative heart disease with auricular fibrillation.....	14		2		1				2		5		1		2		5	
Coronary thrombosis with mural thrombus in left ventricle.....	4						1		1		2							
Subacute bacterial endocarditis.....	2								1		1							
Patent foramen ovale and thrombosis of femoral veins†.....	1										1							
Arteriosclerosis‡.....	1	14		1		1		2		4	1§	6						
Undetermined.....	1				1													
Total.....	34	14	6	1	2	1	1	2	8	4	11	6	1		3		6	

*In listing the occluded vessels, only the one in which the occlusion first occurred is mentioned. In four cases occlusions occurred in vessels of both the upper and lower extremity at about the same time.

†Paradoxical embolus.

‡All cases in which arteriosclerosis was considered the chief inciting cause of arterial thrombosis showed evidence of degenerative heart disease, usually with failure.

§The origin of the embolus in this case was a thrombus on an atheromatous plaque in the aorta.

one becomes familiar with the signs and symptoms of the condition and bears them in mind diagnosis is not difficult. The differentiation between embolism and thrombosis as a cause of occlusion is a more difficult problem, and in some instances an absolute clinical diagnosis may be impossible. If an embolism causes complete occlusion of an artery, the first symptom is a sudden severe pain localized to the region of the obturation. In a few minutes this is followed by numbness, and later by coldness, symptoms which begin in the distal end of the extremity and extend upwards to a point a little below the site of the occlusion. After a short time the original acute pain subsides and is often followed by a severe pain in the area of numbness and coldness. On examination, the affected part is cold; the skin is waxy white or shows a blotchy cyanosis; pulsation in the peripheral arteries distal to the occlusion is absent; sensitivity of the skin is impaired; the reflexes are decreased or absent; and voluntary movements in the distal part of the extremity cease.

An embolus free in the circulation tends to lodge at a major bifurcation of one of the peripheral arteries. This occurs more commonly in the arteries of the leg than the arm. In the leg the artery most often occluded is the common femoral, and in the arm the brachial. When an embolus reaches the bifurcation of a main artery it may completely occlude both branches, or produce complete occlusion of one and partial occlusion of the other. The sudden development of numbness in one leg, and tingling or numbness and tingling in the other, point to an embolism at the bifurcation of the aorta causing complete occlusion of the common iliac on one side and partial occlusion on the other. When numbness in an extremity is followed by tingling it is an indication of a return of blood-flow to the part affected by the occlusion. In partial occlusion of the common iliac artery a murmur may be heard over this vessel.

With complete occlusion of the aorta by an embolism, the sharp pain at the onset is referred to the back, and numbness and coldness extend up both legs to Poupart's ligament. Pulsation

in both femorals is absent. Pain in the lower abdomen suggests occlusion of one or both common iliac arteries. Occasionally the pain in the back or in the lower abdomen may be replaced by a similar pain localized to one upper thigh. In this instance the embolism has passed into the common femoral artery. If an acute pain develops in the calf or foot after occlusion of the femoral or more proximal arteries one should suspect occlusion in this area from a fragment coming from the site of the original occlusion. Recurrent emboli or pre-existing organic disease of the peripheral arteries, or a combination of both, are usually responsible for the failure of pulsation to return in the foot after the successful removal of an embolus from one of the larger arteries. As to the localization of the embolism primarily responsible for the occlusion, the site of the first acute pain or the first bifurcation of the main arteries above the upper limit of numbness, coldness and discoloration is the best guide.

As the signs and symptoms of acute arterial occlusion are nearly all the result of the sudden cessation of blood-flow, the clinical picture in arterial thrombosis is naturally very similar to that found in arterial embolism. It is, nevertheless, important to differentiate between the two conditions, particularly if treatment by embolectomy is to be contemplated. With the exception of the popliteal artery, occlusion of the larger arteries from thrombosis is not marked by the sudden onset of pain as in complete occlusion by embolism. A gradual rather than a sudden onset of numbness or of numbness and tingling is characteristic of thrombosis. As arteriosclerosis is the important inciting factor in the development of thrombosis, a history of intermittent claudication, numbness or tingling, or coldness of the lower extremities antedating the onset of the acute occlusion is often obtained. Although an acute occlusion from embolism may develop at any age, thrombosis, apart from that due to infection or trauma, rarely occurs before fifty years of age.

TREATMENT

The primary object in the treatment of acute arterial occlusion is the early re-establishment of an adequate peripheral circulation in the affected part. Embolectomy, therefore, would appear to be an ideal method for the immediate treatment of acute occlusion due to embolism. In 1933, Pearse[5] made a statistical study of the results of 286 embolectomies on cases reported in the literature on the subject. A good result was defined as one in which embolectomy restored a competent circulation for more than a month after operation. He found that the immediate results following embolectomy were good in 40 per cent of the cases operated upon in the first ten hours after the onset; 14 per cent in the second ten hours; and 8 per cent in the third ten-hour period. The percentage of satisfactory results from embolectomy was greater in the upper than in the lower extremities.

Ten of our patients were treated by embolectomy, 7 in the first ten hours and 3 between ten and twenty hours after the onset of the occlusion. In three patients with occlusion in the upper extremities, the immediate results following embolectomy were satisfactory. Five weeks later one of these patients died from cardiac failure; one, four months later, developed an occlusion of the right femoral artery, and embolectomy six hours after the onset was unsuccessful. The results after operation on the lower extremities were less favourable. In only 2 out of 7 patients was embolectomy followed by a satisfactory return of circulation. One of these died shortly after the operation from infarction of the kidney and pneumonia; the other, six months later, with symptoms of occlusion of the mesenteric artery.

The statistical study of Pearse clearly shows the importance of early diagnosis and prompt treatment. It is evident that embolectomy is of little or no value when carried out later than ten hours after the onset. The poor results after the first ten hours can be accounted for by the development after operation, and possibly before, of secondary thrombosis at the site of the embolism. The higher percentage of good results in the upper extremities is to be expected. It is well known that in thrombo-angiitis obliterans of the upper extremities pulsation may be absent in both the radial and ulnar arteries without any significant disturbance of the peripheral circulation of the hand. The more favourable results following embolectomy in the upper limbs are due, no doubt, to the better collateral circulation which develops in the upper than in the lower extremities after arterial occlusion. Two of our patients with

acute occlusion, one of the subclavian and one of the brachial artery, made satisfactory recoveries without embolectomy or any other special form of treatment.

The resulting impairment of the peripheral circulation in acute arterial occlusion is due in part to the occluded vessel or vessels and in part to the increased vasoconstrictor tone of the smaller arteries which form the collateral circulation distal to the occlusion. Leriche[2] considers that the increased vasoconstriction in these vessels is due to abnormal nervous reflexes from the site of the occlusion. He advocates arteriectomy, a resection of the occluded portion of the artery, so as to abolish the zone of abnormal reflexes. The reaction on the collateral circulation following this operation is the same as a periarterial sympathectomy. Leriche reports excellent immediate results following arteriectomy. This method of treatment has not been tried to any extent on this continent.

In embolic occlusion marked spasm is present at the point of occlusion, as well as increased vasoconstrictor tone in the collateral circulation. For this reason, and also because of the fact that early embolectomy may be impossible, Denk[3] was prompted to try the intravenous injection of papaverine, an antispasmodic drug, in the treatment of acute occlusions due to emboli. He reports restoration of an adequate circulation in 6 out of 10 cases; of the six, five were treated within ten hours of the onset of symptoms, and one with an occlusion in the upper extremity at fourteen hours. Among the 4 patients who failed to respond to papaverine, 2 were treated late—twenty-four and seventy-two hours after the onset. One had marked peripheral arteriosclerosis, and in one no cause for the lack of response was found. As yet this method of treatment has not had an extended trial. In a case reported by Allen and MacLean[6] striking improvement in the circulation of the right leg followed injection of papaverine, but there was no response in the left leg. De Takáts[7] observed prompt and marked improvement in the collateral circulation in two patients following the intravenous injection of papaverine.

Recently, Landis and Gibbon,[8] and Herrmann and Reid[9] have demonstrated that in chronic obliterative vascular disease the blood-flow in the peripheral circulation can be increased by alternate positive and negative pressure. Herrmann and Reid, using the Pavaex apparatus designed by Herrmann, applied this mode of treatment in acute arterial occlusion. In the past three years[10] they have treated by this method 7 patients with acute occlusion from embolism and 14 from thrombosis. Six of the 7 patients with embolism have had no return of symptoms. One patient with coronary thrombosis, myocardial insufficiency and a low blood pressure did not respond to treatment. All of the 14 patients with thrombosis became free of symptoms after an intensive course of 75 to 100 hours of Pavaex treatment within a period of three weeks. Others have not been able as yet to give this method of treatment a satisfactory and adequate trial. De Takáts[11] reports unsatisfactory results in 4 patients, but none were treated in the first ten hours after the onset of the occlusion. Wilson and Roome[12] treated 3 patients: one died of cardiac failure three days after the occlusion; another patient, seen thirty-six hours after the onset, received intensive treatment, but failed to respond and died in seventeen days from a cerebral embolus; the third patient, with an occlusion of the right femoral artery, made a complete recovery, but was also treated by papaverine.

Five of our patients have been treated with alternate suction and pressure by Dr. Gardiner. One, with an embolus at the bifurcation of the aorta causing complete occlusion of the right common iliac, responded well to an intensive course of treatment. Another with an embolus in the popliteal artery and secondary thrombosis of the femoral made a satisfactory recovery after daily treatments for one month. Two patients with marked peripheral arteriosclerosis developed acute occlusion of the popliteal artery on one side. Pain and cyanosis were relieved after fifteen minutes' treatment, but reappeared when the treatment was interrupted. When daily treatment had to be discontinued at the end of a week there was definite improvement in the peripheral circulation. Later, signs of gangrene in the foot developed in both cases and mid-thigh amputations were performed. The fifth patient was suffering from subacute bacterial endocarditis and developed an occlusion of the popliteal artery. No improvement followed a short course of treatment and the patient died soon

afterwards from the primary disease. Four patients not included in our series were also treated by Dr. Gardiner. Two made a good recovery after an intensive course of treatment, and 2 showed temporary improvement of the circulation but subsequently required amputation. Although our experience with this method of treatment has been limited, we are inclined to agree with Herrmann and Reid that Pavaex therapy is an effective method of overcoming the circulatory insufficiency in acute arterial occlusion from embolism and thrombosis. According to Herrmann,[10] the chief cause of failure to obtain satisfactory results is an inadequate amount of treatment. He recommends approximately five hours' treatment daily for a period of three weeks.

DISCUSSION

Until recent years the treatment of acute arterial occlusion has been confined to palliative methods. With rest in bed and the application of local heat, certain patients developed an adequate peripheral circulation, particularly in the upper limbs, after an acute occlusion of one of the larger arteries. More often the patient died shortly after the onset from toxæmia or from the primary disease, or from a combination of the two conditions; or he was left with a disabled limb; or gangrene developed and amputation was necessary. Embolectomy, therefore, was welcomed as a method for the more active treatment of acute occlusion due to embolism, and for some time was the only effective method available. This is no longer true. The experience of Denk with papaverine and of Herrmann and Reid with alternate suction and pressure go to show that both these methods of treatment, as well as embolectomy, may be effective in relieving symptoms and in restoring an adequate peripheral circulation following acute arterial occlusion due to emboli. Until a greater number of cases are treated by papaverine and by alternate suction and pressure, no conclusions can be drawn as to their relative effectiveness with embolectomy in the early treatment of embolic occlusion. Arteriotomy is not indicated in the treatment of arterial thrombosis, and it is generally agreed that embolectomy is of little value in embolic occlusion when performed ten or more hours after the obturation. In arterial thrombosis and in cases of embolism seen late, alternate suction and pressure and application of local heat, combined with injections of papaverine, rather than embolectomy, are indicated.

As acute arterial occlusion from embolism or thrombosis is only an incident in the course of some more important primary disorder, usually heart disease or arteriosclerosis, it must be evident that none of these methods of treatment for the restoration of the peripheral circulation can favourably influence the course of the primary disease or remove the source of recurrent emboli or the inciting factors for the later development of thrombosis. In recommending embolectomy, too little attention has been given to this aspect of the question. Pearse[5] in his statistical study found that 52 per cent of patients subjected to embolectomy died within one month after operation. The cause of death was cardiac failure or recurrent emboli, the operation being a negligible factor. These results clearly point to the need for greater care in the selection of cases for embolectomy. The adoption of conservative methods for the immediate treatment of all patients with acute arterial occlusion, as recommended by Herrmann and Reid, is indicated.

SUMMARY

In the treatment of acute arterial occlusion early diagnosis is of first importance. It is not a difficult problem. The symptoms and signs are characteristic. As soon as a diagnosis is made, the patient should receive an intravenous injection of one-half a grain of papaverine hydrochloride, and be transferred to a hospital for more complete investigation and further treatment. If arterial thrombosis is present, the patient should be given an intensive course of treatment by alternate suction and pressure. Between treatments the limb should be kept under an electric cradle at a temperature of from 35 to 40° C. (95 to 104° F.). Further injections of papaverine should be given every six hours during the first three or four days. If the response to treatment is not satisfactory, and amputation becomes necessary, it can usually be done at a lower level and healing of the stump is more prompt as a result of the preliminary treatment. In cases of embolic occlu-

sion affecting the lower extremities, the same plan of treatment should be followed or, if the patient is seen early, embolectomy may be considered. In view of the better development of the collateral circulation in occlusion of the upper as compared with the lower extremity and the natural tendency toward recovery of the peripheral circulation, the injection of papaverine and the local application of heat are probably the only methods of treatment necessary for embolic occlusions of the upper extremity.

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THE MEDICAL TREATMENT OF RINGWORM OF THE SCALP*

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WHEN the scalp of a child under the age of puberty becomes infected with ringworm the large hair-shafts and the deep follicles within which they are rooted present a formidable barrier to the simple remedial measures which suffice in ringworm of the glabrous skin. The fungus packs the follicle, forming a mass about the shaft, and in some varieties invades the shaft itself. Eradication of the fungus is the objective to be aimed at in all cases of ringworm. Since the bulk of the infective material is in or closely attached to the intrafollicular portion of the shaft, removal of all infected hairs will accomplish removal of the infection. This may be termed a mechanical method, and has been that chiefly relied upon up to the present.

In the pre-roentgen-ray era intensely irritating applications were often employed. This was really a mechanical method, since the effect was to set up a suppurating folliculitis, and the hairs together with the infecting agent were washed out in the purulent flux. Since individual extraction of every infected hair by hand was wholly impractical, even had it been possible to distinguish the healthy from the infected hairs *in situ,* attempts were sometimes made to tear them out *en masse* by the application of some sort of adhesive cap which was then ripped off. Many obvious disadvantages attached to such methods and they were evidently not in very general use. The generally unsatisfactory state of the treatment of this disease was evidenced by the establishment of the "ringworm schools" in Paris. Advantage was taken of the observed fact that with the onset of puberty ringworm of the scalp almost always dies out and a spontaneous cure is achieved. Evidently some biochemical change occurs in the skin of the scalp at this time which produces an unfavourable environment for the growth of ordinary ringworm fungus. In Paris all infected schoolchildren, who must have been numerous, were segregated into special schools where their education might proceed without interruption and without the risk of infecting others until the natural cure was accomplished. The disease was to some extent controlled in this way.

With the advent of the roentgen-rays and the discovery that epilation of the scalp could be produced by this means, all this was changed,

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and the first-fruits of the successful use of this branch of therapy in ringworm was the disappearance of the "ringworm schools". Experienced operators learned to control the dosage so that the margin of safety between the dose necessary to secure temporary epilation and that resulting in permanent loss of hair was seldom over-stepped. As at present practised with more efficient apparatus and more accurate methods of measuring dosage such a deplorable result as total and permanent baldness rarely occurs, but a case is still heard of occasionally. The epilation dose is usually administered at one sitting. In 18 days a few hairs are found to be loose, and by the 21st day the hair is falling freely and defluvium is practically complete in another day or two. This is, of course, a mechanical eradication of the disease. Whatever effect the rays may have on the fungus, directly or indirectly, the removal of the hair, and with it the infecting agent, is the essential feature.

This method is probably in more general use today than any other. There are however certain important disadvantages attaching to it which justify its replacement where possible by safer and equally efficacious methods. The danger of permanent alopecia when the treatment is given by careful, competent and experienced operators is negligible. But unfortunately not all who possess roentgen apparatus and who may even represent themselves as radiologists deserve such qualifications. An x-ray burn is bad enough, and those of the milder degrees are to some extent remediable, but a permanent alopecia may be produced without a burn, and is about as remediable as an amputation.

But, assuming that conditions as to operator and apparatus are ideal, there are some patients who cannot be treated by this method. These are infants or very young children whom it is impossible to control. There are some older children who through emotional instability or mental defect cannot be controlled easily. Not only is there danger of electric burns or electrocution from non-shock proof apparatus, but the irregular movements of the subject will result in inadequate or excessive dosage. Methods of restraint have been devised, more or less effectual, ranging from various forms of strait-jackets to sedatives or general anæsthesia. In certain cases their use may be unavoidable but they seem to be methods suitable only as last resorts in extreme necessity.

While the great bulk of the infective material is removed when the hair falls, occasional fringes or tufts of hair, sometimes so fine and colourless as to be almost invisible, often remain behind, retaining some fungus. It is also thought probable that a scattering of spores may remain on the surface or clustered about follicular openings for some time. Follow-up treatment, such as daily shampooing and the use of a mild fungicidal lotion or ointment, will clean up these remainders, and is an essential part of the treatment for preventing re-infection of the new hairs as they grow in, and decreasing the risk of contagion to others. But the busy doctor is apt to consider the x-ray epilation as constituting the sum of treatment, and a cure represented by a hairless scalp three weeks later. For this reason every dermatologist frequently encounters children whose hair is growing in after a successful epilation who still have ringworm of the scalp.

There are other minor disadvantages attaching to x-ray epilation, such as the time which must elapse between the application of the treatment and the defluvium, during which period the patient is as capable of spreading infection as ever; and the time following the defluvium before any sign of hairy covering of the scalp makes its appearance, during which the child is an unhappy little social pariah, especially if it chances to be a girl. Nevertheless there is still a proportion of cases in which x-ray epilation is not only the best but the only desirable method of treatment.

The use of thallium acetate, which produces a total defluvium from the scalp by its action on the sympathetic system, is another mechanical method. It is a method with which the writer has had no personal experience. The impression is gathered from the literature that it has never become as widely employed as roentgen-rays, and its use is declining. It offers certain advantages over roentgen-rays, such as rapidity, inexpensiveness, completeness of epilation and freedom from danger of burns or permanent epilation. Its major disadvantages — the high toxicity of the drug, the narrow margin of safety, decreasing rapidly as the age of the

patient increases, necessitating the most elaborate precautions in weighing the patient and the drug and apportioning the latter to the former, where a slight miscalculation will result in prolonged and incapacitating illness and possible death, unpleasant sequelæ occurring sometimes even where the dose has apparently been correctly measured—seem in the opinion of many to outweigh its advantages by a wide margin. It also shared some of the minor disadvantages of x-ray epilation. Davidson[1] and his co-workers observed that regrowth of new hair commences before defluvium is complete, and, moreover, infected hairs were slower to fall than healthy ones, hence new hairs are still more likely to be infected than after roentgen-epilation if special precautions are not taken. This method probably has a legitimate but very limited application.

Ringworm of the scalp may be caused by one of the members of two distinct and unrelated classes of fungus. These are the Microspora and the Megalospora or Trichophyta. The proportional incidence of these two classes varies with geographic distribution. On this continent the great majority of cases are caused by the Microspora, and of the members of this group most commonly occurring is the one parasitic on human beings, *M. audouini,* and the next in order of frequency are parasitic on animals, especially *M. lanosum* and/or *M. felineum.* Ormsby[2] says that the former produces the epidemics seen in schools and public institutions and the latter is responsible for the family epidemics.

Most observers make a distinction in the clinical pictures produced by the "human" and "animal" forms of the Microsporon group. The former is usually a dry patch covered by fine greyish or yellowish branny scales, in which hairs are represented only by a short stubble of broken stumps mingled with some lanugo. The latter is more inflammatory, with erythema, œdema and suppuration, often producing elevated boggy tumours with multiple openings from which pus oozes. It has been observed that the latter, the "animal" type, is not only more amenable to treatment by local medication, but a tendency to spontaneous recovery has been reported by Lewis[3] and other observers. In a later paper Lewis[4] reported the treatment of 37 cases of Microsporon ringworm with ointments in which the most frequently employed active ingredients were iodine crystals, thymol and oil of cinnamon. He found that uniformly good results were obtained in the 13 cases of the group caused by the "animal" type, and failures occurred in the remaining cases due to the "human" type.

The clinical distinctions described between the "animal" and "human" types of infection are not wholly reliable. The Microsporon group can be distinguished from the Trichophyton by microscopic examination of the infected hairs, or even more quickly by examining them *in situ* under Wood light, shortly to be referred to. But since many cases of "human" type Microsporon infections have been subjected to irritating treatment before coming up for examination sufficient inflammatory reaction sometimes results to suggest the "animal" type. On the other hand a proportion of cases of "animal" infection shows a minimal amount of inflammation. Thus the clinical test cannot be relied upon, and the only conclusive test is by culture. Workers generally in selecting cases for medical rather than mechanical methods of treatment have had to depend upon cultural distinctions.

During twelve years' practice on the Canadian Pacific Coast the writer has not to his knowledge encountered a case of Trichophyton infection, and concludes that it is extremely rare, if it occurs at all. While both the dry, scaly, and the suppurative cases are encountered he has come to the conclusion that the majority of cases are of the "animal" type of Microsporon infection. Cultural methods have not been regularly employed, and this to some extent affects the validity of these conclusions. But a careful questioning and search for sources of infection, routine microscopical examination of hairs prior to 1927, and routine use of the Wood light and frequent microscopical examinations since 1927 have been faithfully practised in every case. Also in comparing notes with other dermatologists on the northwest Pacific coast, some of whom have used cultural methods more extensively, similar experiences have been related.

In the writer's private practice prior to 1927 ringworm of the scalp was treated by x-ray epilation, followed by the use of some preparation of iodine, mercury or essential oils. There

were rare exceptions in the cases of early single patches in which successful results were obtained by the use of 10 per cent iodine crystals in goose-grease. In every case microscopic examination of broken hairs and stumps was done repeatedly. Suppurative lesions were exceptionally encountered, but in many cases typical circinate lesions were present on the skin of the patient or immediate contacts, indicating an "animal" type of infection. A large proportion of cases were members of a family in which other members presented lesions of the scalp or glabrous skin, and in most of these cases a cat, either in the home of the patient or a neighbour, was suspected. Many of these animals, both Persians and alley varieties, were examined, some under Wood light, and in a number scaly bare patches were found about the head or feet. Most of the suppurative cases were not severe, and in some the animal source was clearly demonstrated. Three exceptionally severe cases are remembered. Two were children of cattle-buyers, and the other was the child of a farmer who was suffering from a very severe ringworm of the beard. The man believed that he had contracted his infection while dehorning cattle.

In 1927, after reading a number of reports in European journals on the use of Wood light in dermatological diagnosis, one was found by A. C. Roxburgh, of London, in which a source of supply of the Wood glass was mentioned. This paper[5] was apparently the first report published on the subject in English. A piece of Wood glass was obtained from London, and in February, 1928, a group of children from an institution were shown at a clinical meeting of the Vancouver Medical Association to demonstrate the fluorescence of ringworm hairs under Wood light. Since December, 1927, the Wood light has been used regularly in all scalp ringworm cases in private practice, and three or four years ago it was introduced into the Skin Clinic of the Vancouver General Hospital. With its aid the extent of the infection, always greater than apparent by examination under ordinary light, can be immediately determined, contacts examined, and incipient cases detected, since a single infected hair in a whole scalp of healthy hair can be seen clearly. After defluvium caused by x-rays or thallium any remaining infected hairs can be detected. This is possible because infected hairs fluoresce characteristically in the portion of the ultra-violet spectrum which passes the filter of Wood glass. Its use for such purposes was fully described in a paper published by the present writer eight years ago.[6] The experience of treating 11 children from an institution in which ringworm had been endemic for years was described. A number of contacts were also examined at the same time and confidently pronounced uninfected. Without the Wood light this would have been impossible. These cases are presumed to have all been infected with "human" Microsporon, although in one case suppuration had occurred. This is believed to be the first report which was published in American literature on this subject. This feature of ringworm diagnosis and therapy is dwelt upon because it is held that its use is indispensable. Without the test of the Wood light it is impossible to state with certainty and within a reasonable time when a case is cured. Today it is part of the equipment of every properly furnished private or public skin clinic.

In July, 1928, E. P. Lieberthal, of Chicago, published a brief report of half a dozen cases of Microsporon infection of the scalp which he had treated successfully by a simple technique of topical applications.[7] Distinction was not made between "human" and "animal" types. The cases were all cured in a period varying from 5 weeks to 6 months, the longer time being required by two patients whose attendance was very irregular. This method was at once adopted in the treatment of two private cases of the author's, in which consent could not be obtained for x-ray treatment. The results were entirely satisfactory. In the six years which have elapsed since then the Lieberthal has gradually come to replace all other methods in the writer's private and dispensary practice. No private case has been treated with x-rays since July, 1933. During this time 83 private cases have been treated. Thirty-eight have had x-ray epilation, 31 were treated by the Lieberthal method, and 16 have been treated with other types of local medication. There has been one failure with the Lieberthal method, for which no cause can be assigned, and one other case failed to respond to other types of local medication. Both of these were subsequently treated successfully by x-ray.

No selection of cases for x-ray or Lieberthal treatment based upon presumed "animal" or "human" types was made. Of the 30 cases

successfully treated by the Lieberthal method all but 4 presented dry non-inflammatory patches covered with greyish branny scales. These features are supposed to be characteristic of the "human" type, believed by authors previously quoted to be refractory to medical treatment. A number of these were thought to be infected by cats or dogs, and some of the animals were examined and found to be justly suspected.

The time required for cure, a negative finding under Wood light being the accepted criterion of cure, ranged from 3 to 22 weeks. In the case taking the longest time treatment was interrupted by an attack of measles. Four cases required 11, 10, 9 and 3 weeks respectively, and the remaining 26 cases took from 4 to 8 weeks. Thus it is seen that over 86 per cent were cured in 8 weeks or less. This time compares advantageously with x-ray treatment, in which 3 weeks must elapse before defluvium, and another 10 weeks before the head ceases to be unsightly from baldness, during which time some form of local medical care is necessary to ensure against recurrence. With the Lieberthal method the scalp is at no time denuded and the hair never halts in its growth. Other forms of medical treatment, where successfully employed, took a longer time, except where only a solitary small patch existed.

The method, as described by Lieberthal, consists simply in clipping the hair short and keeping it clipped close throughout the treatment, shampooing the scalp each morning with soap and water, and rubbing in 10 per cent ammoniated mercury ointment nightly and on alternate mornings. On the intervening mornings all visible patches were painted with 5 per cent aqueous solution of mercurochrome-220. The latter application was made at the office or dispensary. With experience the writer has introduced slight modifications. The ammoniated mercury was dispensed in a simple vaseline base, and rubbed into the entire scalp. The mercurochrome was applied at the office by rubbing the patches vigorously with moistened cotton pledgets under direct observation with the Wood light. For the past two years this has not been done at the office, but the visible patches were treated by the parent at home. The scalp is inspected under Wood light every week or two, and any groups of fluorescent hairs where no scaling is visible, hence likely to be missed, are ringed with a grease pencil.

Reporting later on a series of 25 cases Lieberthal[8] presumes that the success of the method is due to the rapid penetration of the mercurochrome to the hair papillæ. He has demonstrated this in guinea-pigs, but, recognizing the difference between their skin and that of the human scalp, he hesitates to draw hasty conclusions, and an opportunity to repeat the biopsies with a human subject has not occurred. No signs of renal irritation by absorbed mercury has been observed by either of us.

SUMMARY

As far as can be determined by non-cultural methods, ringworm of the scalp as encountered in children of the northwest Pacific coast appears, in common with other parts of North America, to be caused most frequently by the members of the Microsporon group of fungi. The Trichophyton or Megalosporon is rarely encountered.

Distinction between the "human" and "animal" types of Microsporon cannot be made safely by the clinical appearances, but on the northwest Pacific coast the clinical appearance supposed to be characteristic of the "human" type largely predominates.

Experience with a method of medical treatment is described which, on the northwest Pacific coast at least, is uniformly successful in Microsporon infection, whatever the type.

It is considered that this method offers conspicuous advantages over mechanical methods (x-ray- and thallium-epilation) and should supersede them in Microsporon infection. The advantages over other forms of medical treatment are less marked, but it is to be noted that their advocates claim value for them only in the "animal" types of infection.

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MEASLES ENCEPHALITIS*

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A REVIEW of the literature on the nervous complications associated with measles discloses only two cases[1, 2] reported from Canada. Our experience with the following 6 cases would indicate that the condition either occurs more frequently than is recognized or that it is on the increase. These cases were observed in private practice during two epidemics, in 1932 and 1935, in which 211 cases of measles were treated.

Our interest was first aroused in this condition by the following case:

CASE 1

(No. 10,065) Donald M., a white boy, aged 7 months, had been under observation for feeding care since birth. He was the fourth child, and there are no hereditary diseases. The father has subsequently died, presumably of suicide following economic reverses. His mother and three brothers are still living and well. His birth was normal, and examination during the first day and subsequently periodically had disclosed no evidence of birth injury or congenital anomaly. He was breast-fed throughout. On May 22, 1932, his eldest brother developed the typical rash in an ordinary attack of rubeola, which was epidemic. The following day the patient developed listlessness and anorexia, and a faint macular rash over the trunk. That evening tachypnœa and cough developed, and the temperature was 104.4°. The rash had disappeared. The lungs were clear, but the mucosa of the nose and throat was red. The conjunctivæ were not injected, and there were no Koplik spots. He was treated with steam, silver protein solution in the nostrils, and sedatives. The next day he was much improved, and he showed no further signs until June 2nd, ten days after the onset, when fever and irritability recurred, and he was found to have a bilateral otitis media, which was drained. He then improved, while his two other brothers developed typical measles. On the morning of June 7th, fifteen days after the onset, he refused to nurse, and vomited when forced. The cough, which had disappeared the day after the onset, had recurred. His temperature was 100.4° The conjunctivæ were injected, with a definite line. The nose and throat were acutely inflamed, and the buccal mucosa was injected opposite the site of the lower molars. The left ear was draining profusely, and the right drum was dull but not bulging. That evening he nursed better, but the cough was more troublesome. Next morning he was more listless, and his temperature had risen to 106.2°, but no further signs of measles had developed. The right drum was incised and pus obtained. The orifice in the left drum was enlarged. The lungs remained clear, and there were no signs of involvement of the nervous system. During the day listlessness became more marked, but in the early evening he was brighter. Quite suddenly he became comatose and developed Cheyne-Stokes respiration. Shortly afterwards the right arm became spastic. His temperature was then 105.1°. The left pupil was dilated, and the head and eyes were turned towards the left. The right side of the body was rigid. There was no rash. The conjunctivæ were red. There were typical Koplik spots on the buccal mucosa of both sides. The heart was rapid, but the sounds were of good quality. The breath sounds were harsh throughout, with coarse bubbling râles at both bases posteriorly. Spasms of generalized rigidity developed, and then became less frequent. There was no cervical rigidity, and the Kernig and Brudzinski signs were negative. The periods of apnœa became more prolonged, and respirations finally ceased two and a half hours after the sudden onset of coma and seventeen days after his first contact with measles.

The autopsy was performed by Dr. W. A. Lincoln. There was a small patch of red hepatization at the base of each lung. Apart from the head there were no other pathological findings. On opening the skull the brain bulged. On opening the meninges there was a large amount of clear and rather viscid fluid, and the brain appeared to be œdematous. No pus was found. The whole brain was engorged, and over the left parietal lobe there was an area of hæmorrhagic necrosis which extended only a very short distance from the surface into the brain tissue. This area was not well defined but shaded off into numerous small discrete punctate hæmorrhagic spots about the size of the head of a pin which covered the whole of the brain with varying distribution. On section, the base of the brain and the cerebellum appeared normal. The lateral sinuses were opened and showed no thrombosis and no pus. The left mastoid cavity contained a small amount of brownish viscid fluid, but no pus. The right mastoid cavity appeared normal. Unfortunately no material was saved for microscopic study.

Two other cases seen in the epidemic three years later are definitely so-called measles encephalitis:

CASE 2

(No. 17,313) Samuel H., a Hebrew boy of 5 years, developed a typical rubeola rash on March 30, 1935. He is the elder of two boys, and there was nothing in the family history nor in the past history of significance. The onset of his trouble occurred four days before the rash with nasal discharge, fever and coryza, but during the prodromal period there was a considerable degree of nausea and abdominal pain. Apparently he ran a normal course until the fifth day of the rash, when severe vomiting developed, and during the succeeding two days he seemed to vomit everything taken by mouth. Constipation developed concurrently, and with it the patient became very drowsy. One week after the onset of the rash the family physician was called, who succeeded in controlling the vomiting and constipation with glucose and with enemas. During the three days under his care at home the stupor became more marked. He was admitted

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to the Calgary General Hospital on April 8th, nine days after the onset of the rash.

On admission, temperature and pulse were normal. He was stuporous, but could be partially aroused, when he became fretful, irritable and irrational. There were no signs of meningitis. The patellar reflexes were diminished, and there was generalized decreased muscle tone, but neurological examination disclosed no other positive findings. There was a brawny macular rash, typical of fading measles. There was a definite Koplik spot on the left. The tongue was heavily coated. The tonsils were large and subacutely inflamed, and the regional glands were palpably enlarged and indurated. The abdomen was scaphoid and there were no masses, spasticity nor rigidity, and no tenderness on superficial palpation, but on deep palpation the child was partially aroused and cried out and objected to the manœuvre. The examination was otherwise normal.

Urine showed acetone and an occasional hyaline cast on admission, but this cleared in 24 hours. Red blood cells, 5,226,000; hæmoglobin, 99 per cent (Sahli); white blood cells, 14,600; polymorphonuclears, 70 per cent; lymphocytes, 18 per cent; large mononuclears, 12 per cent. Blood sugar, 114.8 mg. Urea nitrogen 32.8; non-protein nitrogen, 65.6 mg., which fell to 55.5 at the end of the first week and was 30 on discharge. Creatinin, 3 mg., which was the same at the end of the first week, and fell to 2 mg. on discharge. The tuberculin test was negative. By lumbar puncture 10 c.c. of clear spinal fluid were withdrawn under slightly increased pressure, but the pressure was not measured. There was 1 cell per c.mm., and all cells seen were lymphocytes. Globulin was slightly positive by Noguchi's test. Direct smear showed no pus cells nor bacteria, and culture gave no growth.

Fluids with carbohydrates were given by mouth and tap water by rectum. The vomiting persisted long after the acetonuria had disappeared, but gradually improved as the patient became brighter and more cooperative. The temperature was irregular, both elevated and subnormal, for six days, then became normal and steady. The stupor and irritability cleared completely. He was discharged without any residual signs on the 26th day. He is now perfectly well.

CASE 3

(No. 9,644) Dorothy M., a white girl, aged 4 years, developed typical rubeola on April 23, 1935. She first came under observation at the age of 8 months for feeding care. She was the eldest of three, and the family history was negative. She was a full-term eight pound baby at birth and was delivered by forceps, but numerous subsequent examinations have not shown any signs of birth injury nor of congenital anomalies. At 13 months she was immunized against diphtheria, scarlet fever, pertussis, and smallpox. Apart from one mild attack of acute rheumatic fever her past history has been uneventful. She had the usual four days prodromal period of nasal discharge, cough, and photophobia. When seen the day of the exanthem she had the typical rash, conjunctivæ, mucosæ, characteristic Koplik spots, and fever. Her course was uneventful until the eighth day, when she became drowsy and feverish. There was no vomiting, headache nor convulsions. The following morning she was quite stuporous, and when aroused was irritable and irrational. The temperature was 106.2°. Apart from the stupor and irrationality the neurological examination was negative. There was no tachypnœa and the lungs were clear. The tongue was coated, the buccal mucosæ injected, and the throat and conjunctivæ were very red. The tonsils were huge, red and clean, and the regional glands were palpably enlarged and indurated. The rash was fading.

She was given 2 c.c. of a commercial placental globulin intramuscularly, all that was available at the moment. She remained in coma all that day and night, with occasional slight muscular twitchings. Next morning she was bright, rational and cooperative. Her temperature was 98.6°, the throat and conjunctivæ were less fiery red, and neurological examination was entirely normal. Her subsequent course was uneventful, and she is entirely free from sequelæ.

Two other cases of acute encephalitis, both seen during epidemics of measles, and both with a definite history of contact, cannot be established as encephalitis associated with measles.[3] Nevertheless, the coincidence of the incubation periods and their similarity to cases definitely associated with measles seems to warrant their discussion in this connection, in order that the possibility of a measles encephalitis associated with an abortive exanthem may be considered.

CASE 4

(No. 6,496) Harvey G., a two-year old white boy, was seen in consultation on March 27, 1932. He was the only child, and the family history was negative. He was a full-term baby, birth weight 7 pounds 14 ounces, and was delivered by forceps. He was first referred at the age of 10 weeks for feeding supervision, and was under regular observation until 6 months of age, when he was returned to the family physician. With the exception of two attacks of nasopharyngitis, his past history was uneventful. From two weeks till ten days before the above date he was intimately exposed to a typical case of rubeola. Five days before he was seen he developed fever, which was followed by cough, coryza and photophobia. The day before he became stuporous and irritable, and when aroused was combative and irrational. Temperature was 104.1°. The conjunctivæ were red, without a definite line, but there was definite photophobia and lachrymation. The mucosa of the nose and throat was red, and there was a profuse serous nasal discharge. The buccal mucosa was red and injected; there were no Koplik spots. The breath sounds were harsh, but the lungs were otherwise clear. The skin was entirely clear, and at no subsequent time was any rash observed either by the family physician, the nurse, or the members of the family. Neurological examination disclosed no further signs.

The family refused hospital care and also refused to permit lumbar puncture at the home. The temperature ranged around 105° for over a week, most of which time he was in coma. At times there was a suggestive cervical rigidity, but this was only transient. There were no convulsions, and no further neurological signs developed. As the temperature fell gradually the sensorium also cleared, and by the fourth week he appeared normal mentally for his age, but was very weak and thin. He recovered rapidly with a change of environment, has had no sequelæ, and is now a normal robust boy.

CASE 5

(No. 17,720) Ruth L., a white girl of 17 months, was first seen on June 14, 1935. She is the elder of two children whose parents are economically and socially inadequate, and whose intelligence would probably rate a low normal level. Her birth history was entirely normal. She was breast fed for one month, was on the bottle for 13 months, and received no cod liver oil. Her developmental history was normal, and she had had no previous illnesses. Two weeks before the onset she was in contact for one day with a child in the prodromal stage of rubeola. Since then she had been listless and irritable and had developed a slight cough. There had been no real change in her condition until the morning of the

above date, when suddenly she developed a generalized convulsion. When first seen she was in coma with generalized clonic spasms which had been recurring for two hours. Neurological examination gave no further information. Reflexes, obtained between spasms, were normal. The temperature was 97°, and general physical examination disclosed no further signs. The skin was entirely clear, as was the mucosa of the upper respiratory passages and the conjunctivæ. The Chvostek and Trousseau signs were negative.

She was admitted to the Holy Cross Hospital. The urine was entirely normal and remained so. Red blood cells, 5,580,000; hæmoglobin, 95 per cent; white blood cells, 16,400; polymorphonuclears, 54 per cent; lymphocytes, 36 per cent. Blood calcium, 13.8 mg. per 100 c.c. On lumbar puncture the spinal fluid pressure was found to be 25 mm. Hg. Twelve c.c. were withdrawn, which reduced the pressure to 6 mm. The fluid was clear, colourless, and contained 3 cells per c.mm. All the cells seen were lymphocytes. The Noguchi test was negative; smear and cultures negative.

She failed to respond to chloral hydrate, but the convulsions ceased with the lumbar puncture. At times respirations were stertorous. The day after admission the temperature rose to 103°, and generalized convulsions recurred, but ceased when chloroform was administered. The respirations also ceased, but responded to artificial respiration. Deep coma persisted, and later in the day muscle twitchings occurred, but ceased after magnesium sulphate was given intramuscularly. Fluids were given parenterally. There were no further convulsions. On the fourth day she was slightly less comatose but completely irrational. At times a transient cervical rigidity, yawning, head and eyes turned to the right, nystagmus, ptosis of the left eyelid, slight muscular twitchings, and vomiting were observed, but none of these signs were constant. The reflexes remained normal. No rash developed. The temperature fell gradually to normal but remained irregular. Phenobarbital controlled the restlessness. Another lumbar puncture gave no further information. The tuberculin test was negative. The coma gradually disappeared, and the patient ate and slept well, but marked incoordination and irrationality persisted. There was poor muscle tone, especially in the right leg. She was discharged on the 32nd day.

Subsequently she was in contact with measles without developing the disease. At present, at the age of 2½ years, while she looks bright she has a vocabulary of less than a dozen words, all pronounced indistinctly, and she refuses to play with other children. Her reflexes are all normal, and there is no muscle atrophy nor asymmetry, but her gait is staggering. She soils and wets herself unless watched closely, but is not destructive.

The last case may have only a coincidental relationship with measles. But if measles was the etiological agent then it should be included here.

CASE 6

(No. 12,342) Eva B., a white girl, first came under observation at 2½ years of age with epilepsy. There was no history of this nor of any other nervous disease in the family. She was the third child, the first dying of cyanosis of the newborn, the second living and well. She was delivered as a breech without difficulty, and weighed 7 pounds 8 ounces. She was nursed till 11 months and no cod liver oil was given. At 18 months of age she developed measles, which was epidemic. On the day of the eruption she had three convulsions, the last two being severe and each lasting for over half an hour. These were accompanied by a deep stupor which lasted till the following day, on which another convulsion occurred. Epileptic seizures without focal signs then recurred every three to eight weeks during that year. When first seen she had large infected tonsils, but no other abnormalities were found. Phenobarbital controlled the convulsions except in the presence of acute infections. After two attacks of tonsillitis and one of infectious diarrhœa the family agreed to operation, and tonsils and adenoids were removed. Phenobarbital was continued and the patient went through several attacks of upper respiratory infection the following winter without convulsions, having only two seizures, one with the onset of acute bronchitis and the other on the eighth day after smallpox vaccination. Since then she has had only two seizures a year, always in the presence of an infection, and for the past year has not been taking phenobarbital. Apart from these epileptic attacks she is a normal robust girl.

COMMENT

Numerous cases similar to these have been reported both on this continent and abroad. The first report of a central nervous system complication of measles appeared in 1790 (Lucas). Only scant reports appeared up till the beginning of this century, but the number has been rapidly increasing during the past ten years. This increase seems to be both real and apparent. The distribution has been widespread, and it is not likely that Canada has been as fortunate as the reports would indicate.

No attempt will be made here to summarize the literature, which has been well covered by others.[4, 5] Nor are we concerned with the question of nomenclature, because a choice between the terms "encephalitis" and "encephalosis" cannot be made until the true nature of the etiology has been established. Whether the nervous complications of measles are the result of a toxic action or of an anaphylactic reaction,[6] or whether they are due to the direct action of a virus,[7] and whether the virus is that of measles[8] or is one activated by the measles virus[9] are questions which probably will be solved only with increasing knowledge of the nature of virus infections.[3] The presence of secondary infection seems to predispose to the development of encephalitis, and this confuses the quest for an explanation of the etiology.[10]

The pathological findings are restricted to the nervous system, and are similar to those found in encephalitis associated with smallpox vaccination, smallpox, rabies vaccination, and influenza. In the severe fulminating cases there appears to be an effect upon all of the elements present.[11] In most of the cases reported the lesions are centred on the small veins of the white matter,[12] which are extensively congested and which in some cases show thrombosis. Surrounding these there is an area of demyelinization with proliferation of microglia, usually along the whole

course of the vessel. In cases with convulsions[13] minute discrete punctate hæmorrhages are found. The degree of hæmorrhage may vary greatly, and there may be no apparent injury to the endothelial lining. Except in the severe fulminating cases the nerve cells show no direct change, and there is no degeneration of nerve fibres.

Clinically, the onset is sudden, frequently of an explosive nature, usually between the third and sixth day from the onset of the rash, but it may occur during the prodromal period or as late as several weeks after. The early symptoms are irritability, headache, vomiting, drowsiness and convulsions, any one of which may initiate the train of events. These are accompanied by a rise of temperature, sometimes extreme, and are followed by stupor, which may be a transient drowsiness or a deep coma lasting more than a week. Recurring convulsions and muscular twitchings are common. The temperature falls during the first week, and the whole clinical course varies in extent from a couple of days to several weeks. During this time a great variety of transient indefinite or uncorrelated neurological signs manifest themselves, none of them being diagnostic. The persistence of neurological signs indicates the development of sequelæ.

The spinal fluid findings, in common with other forms of encephalitis, are not diagnostic. There may be no change. Usually the fluid is clear, under increased pressure, with an increase in globulin, and there may be an increase in lymphocytes, even to over 1,000.[3] The sugar content and the colloidal gold curve vary. Bacteriologically, the fluid is always sterile. Encephalograms are of value[14] in ruling out certain other definite brain conditions, such as tumour and hydrocephalus. The ventricles have been found symmetrically dilated, and there is an increase in the air shadows in the subarachnoid spaces over the cortex. In differential diagnosis, lethargic encephalitis, multiple sclerosis, and anterior poliomyelitis must be borne in mind.

The mortality is between 10 and 25 per cent. Recovery may be complete, but sequelæ result in the majority of patients who survive. The severity of the clinical course is no criterion for prognosis.

There is no specific treatment. Convalescent blood has been used,[15] also convalescent serum[16] both intramuscularly, intravenously, and intraspinally,[17, 18] but some of the more spectacular cases have responded to symptomatic treatment. Our results with placental globulin are suggestive[19] and no similar report has been found. Encephalography may be of therapeutic value.[14] It is to be hoped that the attenuation of measles[20] will offer a means of prophylaxis.

Whether measles encephalitis can occur without a rash, unless death supervenes as in our first case, is open to question. Cases 4 and 5 both have a definite history of contact, with the usual incubation period, and Case 4 had many of the prodromal signs. The occurrence of abortive cases of measles during an epidemic is well recognized. It is established that the involvement of the nervous system may begin during the prodromal stage, and Gröer[21] is of the opinion that in measles the nervous system is constantly affected. The occurrence of these cases during an epidemic is at best only suggestive, and the question cannot be settled in the present state of our knowledge of the condition.

SUMMARY

Six cases of encephalitis associated with measles are reported. The question is raised of the occurrence of this syndrome during an epidemic of measles in patients who have no rash. It is suggested that this condition is more prevalent in Canada than the literature would indicate.

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FATIGUE IN CHILDREN*

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THIS subject has not received the attention it merits, references in the literature appearing infrequently. This is a marked contrast to the study and investigation on fatigue in other spheres, such as industrial fatigue, much of which has been turned to practical advantage in the world of economics. This paper is based on the study of about 125,000 children in institutional and private work during the past several years. Included in it are toddlers and the earlier adolescents. In general it may be summed up that, first, fatigue exists as an entity, a diagnosis, however, which must be very guardedly made, for, secondly, fatigue also exists as a symptom of pathological conditions, many of which are recognized only with difficulty. This differentiation is most important from a therapeutic viewpoint. *Fatigue* is not synonymous with *tiredness*. Tiredness may be a symptom of fatigue but is not necessarily present. Still has recently compared them thus, "Fatigue is a state induced in the tissues of the body, particularly in the nervous and muscular tissue by changes resulting from activity, whereas tiredness is a sensation which, though commonly produced by fatigue, seems to exist sometimes apart from any activity-produced fatigue".

It is somewhat difficult to define fatigue. Physiological experiment has shown that the changes in muscle and nerve cells which are induced by fatigue require a certain period of rest for their disappearance, and that repetition of the activity before sufficient time has been allowed for the muscle cell to recover its pre-activity condition results in more rapid exhaustion when activity is repeated, and, eventually, if the interval between activities is reduced to a minimum there may be complete exhaustion with inability to act until proper rest has been allowed. This phenomenon so observed in individual cells experimentally, it seems reasonable to apply in a modified form to the whole body.

This change resulting in fatigue is due to exhaustion of the substances required for the supply of energy, or perhaps, more exactly, to the accumulation of sarcolactic acid, the excess of which the body has not been able to get rid of. If the work is of such a degree that the lactic acid produced is no more than can be removed simultaneously by oxidation, fatigue will not occur until other factors of exhaustion enter into the problem. Among these are, shortage of fuel, the element of monotony, and, under certain conditions, through disturbance of the mechanism concerned, prevention of loss of heat and moisture. Clinically, it may be stated that fatigue means a diminution of capacity as assessed by the previous optimum of physical fitness. This when applied to children has to be judicially used, for their optimum is a fast changing quantity, and their present capacity has to be estimated.

That fatigue is an accompaniment of an illness is the very commonest of knowledge. In the ill, or unhealthy, fatigue with the symptom of tiredness may be induced by slight nervous and muscular activities, which in the normal child would have no symptoms. This is fully appreciated, in fact recognized in illnesses such as tuberculosis, diabetes, anæmia, cardiac conditions and on down through the index of any medical work. It is expected in such diagnosis, and full allowance made for it, and these will not be referred to again. The trouble comes when there is failure to recognize the etiological pathological lesion, even more so through lack of appreciation of the tremendous part played by apparently trivial or common pathological states in the production of fatigue.

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No hesitation is made in stating that upper respiratory infections account for the greatest amount of fatigue under this heading of morbid fatigue. There is a distinct failure to appreciate the part played by the common infections met with in ear, nose and throat conditions, to say nothing of chronic rhinitis and diseases of the accessory sinuses. Too often stress is laid on the state of the adenoid and tonsillar tissue, and while it may be essential that surgical attention is here required, yet the existing infection in the adjacent structures is quite neglected and chronic infection of these areas may persist for a long time.

Matters relating to the digestive system take next place as a source of fatigue. The term digestive disturbances is purposely avoided, it being a narrower term, and while playing a big part is not for discussion here. In fact the cases in mind do not necessarily produce the ordinary symptoms of digestive upsets but rather are in the nature of improperly balanced diets. One must admit to a feeling that many diet considerations are carried to an extreme, and so diet fads play no part here. Making full allowance for the heavy energy demands of children, nevertheless excessive carbohydrate intake is the chief offender to be looked for. A deficiency diet over a long period of time is a big factor in chronic fatigue, and there is one type almost synonymous with the excessive carbohydrate diet, for it is with this diet that so often is seen protein deficiency. Or again, the above diet, coupled with poor meal habits may produce a carbohydrate indigestion, which in turn often means a diet below the optimal caloric requirements, and a vicious circle is soon established, with an increase of fatigue. Sometimes these types are very easily recognized, but it should be realized that less abnormal diets taken over a prolonged period may be responsible, in whole or in part, for fatigue as a symptom of general ill health.

Poor posture should be considered a pathological state. An upset of the mechanics of the body readily produces fatigue.

Obesity accounts for a certain amount of fatigue. Once this subject is approached one runs into the fascinating field of endocrinology, which is all important in children and youth, and plays a major rôle in relation to fatigue. Obesity is of two general types, alimentary, due to extraneous causes, chiefly over-eating, and endocrine obesity, the latter a large subject, and here there is no intention to extensively explore it. The pituitary and thyroid glands are the hormonal glands chiefly involved. Marked disturbances produce a fairly clear diagnosis, familiar to all, but milder degrees are often not recognized. Cretinism in its various degrees is quickly noted, but in a partial hypothyroidism there may exist lassitude and languor, marked symptoms of fatigue yet due to an endocrine condition. There are more of these types present than is generally appreciated.

While a number of cases of true adiposogenitalis syndrome are seen, yet to a far greater extent exist those cases, particularly in boys, where shortly before puberty there is a general adiposity, particularly in the sites of predilection, this later correcting itself as adolescence advances, but in the meantime the youngster is confronted with this extra weight in his day's work. Or again in the early developed adolescent girl, where there has been very large breast development, she is also confronted with an extra weight out of proportion to her general size. Then there is what is commonly referred to as the big early developed overgrown youth, generally a boy, a transitory phenomenon of the puberty stage, which if in a marked degree is called by some a "puberal acromegaloidism". The out-of-proportioned feet and hands, which lead to the typical clumsiness, do, along with other outstanding features, subside after puberty when equilibrium has been restored, which one is told is between the functions of the anterior pituitary lobe and the other hormonal glands. Be that as it may, these older children fatigue very readily, particularly so as they are inclined to attempt to measure up to youths of their size not of their age, and they cannot do it without marked fatigue.

The light weight and the small undeveloped child also present a problem in fatigue, which has an endocrine background in many cases, this showing particularly in the older child. All are familiar with cases of infantilism, those children of adolescent age whose mental and bodily qualities correspond to that of an earlier age. Varying degrees of this exist showing a narrower zone of normal or physiological

fatigue. In connection with some of these light weight types there seems to be a distinct nutritional factor present not due to undernourishment, due rather to detailed deficiency, such as want of lipoids, and here arises the question of after-effects of the common infectious diseases of childhood. It is well appreciated that the toxic substances of tuberculosis and syphilis have a great chemical affinity for lipoids, yet so also have the causal agents of other infectious diseases, and enough credence is not given to them. The depleting of these stores may be the basis for the development of some of these types of children.

Obesity, mild grades of infantilism, and certain other endocrine disturbances have been singled out, for they present a picture in which fatigue is much present, although the basis varies, and show how handicapped one is in overcoming fatigue by various extraneous efforts unless the basic glandular disturbance is realized.

We have been viewing fatigue in relationship to abnormal body states, and have shown how essential is an understanding of the etiological factor for the necessary therapeutic action. With this appreciation also is seen the futility of extraneous efforts alone, though as auxiliary measures they are useful. Particular emphasis is laid on another angle of this. We are all confronted with parents, who under well meaning advice from child welfare workers, radio talks and literature from the same sources, have been struggling with children labelled malnutrition and underweight, as if there was no such thing as a medical diagnosis at the base of their fatigued condition. Large numbers of these children who are masquerading under this label, are actually suffering from pathological lesions capable of correct diagnosis and treatment. This neglect is often serious, and possibly child welfare workers are not alone to blame for it.

That fatigue is an entity will not be accepted by all. Even allowing for a normal physiological fatigue, some will maintain that the phase of recovery is not a real and full compensation for the expenditure of energy that has taken place. Thus, at the end of any stated period of time there is still some leeway to be made up. Irrespective of the niceties of such a physiological discussion from a clinical standpoint most of us are satisfied that for the average juvenile in good health a reasonable rest after a reasonable amount of work, restores that person to his normal state.

There are, however, many children who are free from pathological lesions, yet who are always fatigued. Lack of rest is the chief consideration, and this may be due either to lack of the average rest required for that age, or to that child requiring more than the average rest for his needs, that is, that physiologically the output of energy exacts more from that individual, and correspondingly it takes longer to get rid of the accumulated end-products. That a difference in reaction does exist is, of course, known experimentally. No matter which of these situations exists it means insufficient rest for the child concerned. The reason varies for the different age groups, depending upon their work and social requirements. In the pre-school age it is generally lack of the afternoon rest, an even greater problem when the child starts to school. This continues throughout the school years with varying changes till the adolescent period is reached, when late hours assume the principal rôle.

But bed and sleep are not the only factors concerned with rest. The lack of opportunity for rest other than this does not receive sufficient consideration. It isn't realized that the child's day is too full. Not only too full of a set routine, but too full of people, no opportunity being given for relaxation from the stress and strain of the day. So little opportunity exists to go his own pace in keeping with his body condition. This is equally bad, whether it is the overburdened program of supervised work and play of the boarding school, or the strenuous day of a public school plus the average small house or apartment overflowing with the family. So little opportunity for the child to be by himself. In the pre-school child the problem is as bad, the endless supervision of a nursemaid, or the countless admonitions of the tired overworked mother all day long — in other words, lack of rest or relaxation periods. Lack of these periods is but one side of the picture, for the whole routine is surrounded by high pressure and rush. This rushing has many repercussions, which needn't be detailed here, but summarized mean not only the elimination of relaxation periods, but are the cause of an unnecessary

output of energy producing the condition of fatigue. One often marvels at the strenuous long hours of play indulged in spontaneously by children, and yet they are fairly fresh at the end of the day. Observation, though, will readily show that children's favourite method of doing things is to attack them in outbursts of energy, attended with periods of rest, and they are engaged in something they are happy and interested in.

Hunger plays a big part in the production of fatigue in all of us, and this is more so in children. It causes normal fatigue to be reached more quickly, and its occurrence day after day produces such an increased amount of fatigue that it does not permit the cycle of recovery to be completed as afforded by the average rest.

This matter of hunger does not only imply lack of caloric requirement for the day but also lack of caloric requirement at intervals distributed through the day, even though the total is eventually sufficient. This problem does not loom so largely in the pre-school child at home, but it is present in the child of earlier school years who misses the extra nourishment received during the day at home. It is present also in the older child, chiefly on account of the poor breakfast, and a mediocre lunch, but the problem reaches its climax in the adolescent girl who prides herself on the "no breakfast" slogan. Nor must one forget the fatigued athletic boy, who is endeavouring to keep his weight down. This all suggests the question as to eating between meals. Perhaps in the majority of cases that come to our offices there has to be drawn up a rigid regimen on the basis of food at mealtime only, but for the average, healthy, active youngster, whose mealtime appetite is good, food at other times is not to be condemned, in fact in many instances it is required. Don't wait for the sensation of hunger, ward it off by nourishment and you'll ward off fatigue.

Increased fatigability within the bounds of normal at puberty certainly is present, and must be allowed for. It is more or less equal in boys and girls. All are repeatedly consulted over boys and girls who in their enthusiasm have used up too much energy in their sports and games, and suffer from fatigue immediate and delayed. Invariably, the question as to cardiac fitness, and the fear of heart strain arises. Rarely, and remember the average fit youngster is under discussion, does a cardiac condition enter into the picture. True, not infrequently, in the early adolescent, there is some cyanosis of the hands, accompanied by a slow pulse, but in most cases this appears to be due to errors in metabolism or to endocrine deficits. These signs of peripheral vascular sluggishness disappear completely under proper management, and are definitely not cardiac in origin.

In looking farther afield for a solution fatigue is often found to have existed in the first place. Physiology has shown that in really violent exercise the quantity of lactic acid is too great for its elimination—in the case of a sprinter 1 gram of lactic acid accumulates for every stride taken, *i.e.*, 40 grams for the 100 yards dash. Athletic training to some extent consists in perfecting the circulation for the removal of lactic acid, and it also embodies the education of the muscles to neutralize fatigue products, or perhaps to tolerate their presence. In prolonged exercise, of moderate degree, the question of lack of fuel—hunger—enters, and experiments upon marathon runners have shown an exact correlation between hypoglycæmia and exhaustion. So there are other factors, and more likely too than cardiac, to be looked for in these cases In the same way the delayed fatigue as shown for a day or so after the exertion is not likely to be due to a cardiac weakness, but to a delayed elimination of accumulated products, which we are told might be those of muscular metabolism affecting the central nervous system. It is well to hesitate on a diagnosis of heart strain before fatigue is thoroughly considered.

At times one is tantalized at the idea that a fit healthy young human, expending an average reasonable amount of energy, with reasonable rest, should develop fatigue. Why should it be? Surely the fit young of our species are capable of standing up to reasonable requirements. Mental attitude and working conditions largely solve the problem. The latter, so far as children are concerned, means school conditions.

Reference is again made to the industrial world, for it is here that we have a direct monetary appreciation of fatigue, for when directors will spend money to overcome fatigue, and increased dividends result, it certainly has a definite practical application, and the same conditions, in a modified form, exist in the world of children, but have received insufficient attention. Much study has been made of industrial

working conditions, and consideration given to the volume of air, its rate of flow, moisture and temperature; lighting arrangements, natural and artificial; the position of benches and machines in relation to the workers' position and posture; the effect of noise, rest periods, and many other matters. These same features apply to the child's school room, and in many instances a number of these conditions which the industrial world has corrected still exist in our up to date schools. The average community will pride itself on its splendid schools, with full modern arrangements, but often efficient detail is lacking or the human element of those in control ignored. Time after time detailed enquiry elicits unexpected poor conditions where general structure and equipment would warrant other findings. Nor has the industrial world neglected the relationship of the mental state of fatigue, and has combated it successfully in highly paid piece work and bonuses, in particularly trying employment.

Excessive muscular effort is reported not to produce mental fatigue, but the reverse is not true. Measurement of output of work is our best test for mental fatigue; it cannot be judged by sensation. It is most evident when the work is of a kind that demands concentration of attention. Antagonistic and irrelevant fields of attention are successfully inhibited, at first without voluntary effort, owing to the incentive of interest, but later, as interest wanes and boredom enters, through the exercise of volition. Finally, as the directive activity of the will fails through fatigue, we can no longer, despite the utmost effort, attend to the work on which concentration is required, local boredom giving place to general fatigue.

Visualize any group of children at a task, particularly one at school, and it is so easy to see these stages develop. It is not only an every-day picture, but a picture many times every day, yet the children are held to these tasks, uncongenial as many of them are. Uninterrupted concentration is unnatural; it is our nature to take repeated brief rests during any period of mental work. This is particularly so with children, yet how seldom this is recognized in the program of a school day. This is appreciated in the primary grades, and allowance made for it, but to a great extent is forgotten as the children progress in school. Bored with the monotony of the work, and aggravated by a fatigued, overburdened teacher, children readily show the typical picture of fatigue.

Throughout this question of fatigue it is indeed no easy matter at times to say just where normal physiological fatigue ends and where abnormal fatigue enters the picture. Also the problem is so linked up with mental attitude and mental fatigue that it is almost impossible to put these phases into water-tight compartments.

SUMMARY

Fatigue is a condition commonly met with in children from toddlers to adolescence. It may be present as a symptom of pathological conditions, many of which are obscure, or it may exist as a primary factor. This is frequently not appreciated. It is very essential that this differentiation be made if fatigue is to receive satisfactory therapeutic attention.

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VIRUS BODIES IN PORADENITIS VENEREA.—A. C. Coles (*Edin. M. J.*, August, 1936, p. 528) reports finding virus bodies in the pus of climatic bubo. Air-dried films made from the pus of four cases were fixed in alcohol and stained in well-diluted Giemsa for twenty-four hours. In one case multinucleated giant cells, 48 μ in diameter, were found, together with large mononucleated cells, 25 μ in diameter, many of which contained one or more Gamna-Favre bodies. These were round, oval, or irregular in shape, 1 to 4 μ diameter, stained almost black, and showed no evidence of internal structure. A few cells also contained deep red-stained granules 1 μ or less in diameter. The other three cases showed quite definitely the presence of elementary or virus bodies. These were most obvious in preparations in which the pus cells were not much disintegrated, and were round or oval reddish-stained bodies, mostly single, sometimes in pairs, and rarely in short chains. They varied considerably in size, but had an average diameter of 0.2 to 0.4 μ in stained films. In parts of the films they were scanty, whilst in others they were present in colonies of almost pure growth. They resembled closely, and were quite as distinct as, the virus bodies in known filterable diseases. The first-mentioned case also showed suspicious but not distinctive similar bodies.—Abs. in *Brit. M. J.*

THE INTERPRETATION OF SOME COMMON DIGESTIVE SYMPTOMS*

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IN the investigation of disease, either in or referred to the gastro-intestinal system, a well-taken history is of paramount importance. Generally speaking, one can learn much more towards the elucidation of a diagnosis from the history than from the physical examination. Even the auxiliary methods of diagnoses, such as x-ray, can lead one far from the path of truth unless one has as his guiding star a carefully taken history. There is the unfortunate tendency to seek short cuts in medicine, and it may not be amiss to stress the importance of learning at the outset the natural history of the patient's disease from the subjective point of view.

One would point out the importance of eliciting symptoms in proper sequence and relationship, both as to their development and the degree to which they cause the patient discomfort. Thus it is usually possible to determine the patient's initial symptom, and to get him to state fairly definitely his presenting symptoms at the time he comes for investigation. May I suggest that it is well at first to let the patient unravel his own story with the aid of a few guiding, but not leading, questions. Then one should search a little deeper, asking specific questions as to the presence or absence of certain symptoms. An effort should be made to establish the order of development of such symptoms and the degree to which they interfere with the patient's comfort.

To carry out an orderly subjective examination of this kind one must have at one's mental finger tips a list of the common symptoms which occur in disease in the digestive tract. Their skilful interpretation leads one far on the road to determining the disease process present. At the risk of being considered too didactic I am going to suggest such a list: (1) loss of appetite; (2) loss of weight; (3) waterbrash; (4) heartburn; (5) dysphagia; (6) flatulence; (7) abdominal discomfort or pain; (8) nausea and vomiting. May I very briefly deal with the interpretation of each of these common findings.

1. *Loss of appetite.*—The sensation of appetite in the normal individual is in part a psychic or memory process, but has as well a visceral component. It is a local manifestation of efficient gastric tone. Any disorder of the digestive tract which interferes with the normal tonus of the stomach muscle will give rise to variations of the normal appetite sensation. Thus loss of appetite may occur with the hypotonic stomach associated with generalized visceroptosis, with the chronically dilated stomach of the patient with pyloric stenosis, in the patient with chronic gastritis, or in the person whose gastric tone is impaired by the infiltration of the stomach wall with a new growth. Increase of appetite is a much rarer finding in digestive disease. It does occur, however, in the patient with duodenal ulcer. In such a person, as one would expect, we find a hypertonic stomach.

It should be mentioned that the sensation of hunger is something quite distinct from that of appetite. Hunger is associated with discomfort, and is accompanied not only by increased tone but by increased peristaltic activity as well. Hunger may occur as the presenting or indeed as an isolated symptom in the dyspeptic patient. He may describe his discomfort as a "sinking sensation" in the epigastrium, relieved by food. Such patients on investigation may show no definite evidence of organic disease, but they do show hyperperistalsis and hypertonicity on fluoroscopic examination.

2. *Loss of weight.*—This should be enquired about, especially in the patient who has passed his fortieth annual milestone. It may occur as a direct effect of loss of appetite in the nervous dyspeptic. More often however it suggests organic gastric disease, such as gastric ulcer, and, more particularly, gastric cancer. Generally speaking, one can say that a gain of weight during the course of chronic gastric illness is fair evidence against organic disease. The one

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exception is duodenal ulcer where the patient gets comfort from food and may eat more than before the onset of his symptoms.

3. *Waterbrash.*—This is the filling up of the mouth with clear tasteless fluid. It is a minor symptom and is rarely mentioned by the dyspeptic patient unless specifically enquired for. It is generally believed to be due to the accumulation of saliva in the œsophagus. Such accumulations are due either to excessive salivary secretion or to reflex closure of the cardia. This symptom occurs most commonly in duodenal ulcer but is present in chronic gastritis.

4. *Heartburn.*—This usually shows itself as a "burning feeling" which the patient localizes behind the sternum, usually near the lower end. It may become a very annoying complaint. It is not, as was once thought, due to acid regurgitation into the œsophagus, since it may occur in patients with achlorhydria. Neither does the introduction of hydrochloric nor organic acids into the œsophagus produce it. The most logical explanation as to its etiology is that it results from cardiospasm. It has occasionally been possible to demonstrate such cardiospasm fluoroscopically in patients with heartburn. In one patient, in whom heartburn of six months' duration was complained of as a single symptom, the fluoroscopic examination gave the picture of achalasia of the cardia. Complete relief was obtained by the passing of mercury bougies. Heartburn is common in functional dyspepsia, particularly in the nervous type, and frequently enough in the toxic type from the excessive use of tobacco or alcohol. It is not at all common in organic disease, but may occasionally occur in gastric or duodenal ulcer.

5. *Dysphagia.*—If we exclude disease in the pharynx, pressure on the gullet from without, and certain functional and organic nervous disorders, we are left with carcinoma of the œsophagus, carcinoma of the cardia, and achalasia as common causes of dysphagia. In achalasia of the cardia the onset of dysphagia is usually more abrupt than with carcinoma. The ability to swallow liquids as well as solids is often interfered with earlier in achalasia. The state of the patient's nutrition is, of course, a helpful guide in the interpretation of this symptom. Weight loss occurs early in neoplastic disease. Further, the latter disease is more apt to occur in the older age groups.

6. *Flatulence.*—An uncomfortable sense of fullness in the epigastrium is due to an increase in tension in the lumen of the stomach from excess of gas. In the great majority of cases the gas present arises from excessive swallowing of air. An air bubble in the cardia, as is well known, is a normal finding. In most patients who complain of flatulence, an increase in the size of this air bubble can be observed. The complaint is however common in patients with duodenal ulcer as an early symptom. Here the air content of the stomach may be normal, but the gastric musculature shows hypertonus.

This symptom is common to practically every form of dyspepsia. Apart from nervous dyspepsia, where flatulence is usually due to ærophagy, it occurs most commonly in chronic gall-bladder disease, appendicular dyspepsia, and peptic ulcer. In the latter conditions pylorospasm which is so commonly present is a likely causative factor in this distressing symptom. Air which is swallowed during the course of a meal normally passes through the pylorus into the bowel where it is absorbed. With the presence of pylorospasm and the associated hypertonus of the stomach a feeling of epigastric fullness from increased tension is to be expected. It should be noted in passing that abnormal collections of gas in the colon may give rise to a sensation of epigastric fullness, and be interpreted by the patient as gastric flatulence. Fermentative processes in the stomach with the production of gas are relatively uncommon. They do occur in the dilated stomach resulting from pyloric stenosis from ulcer or cancer. In such a case however, the gas is usually malodorous, both to the patient and the observer, giving a clue to the diagnosis.

7. *Abdominal discomfort and pain.*—This is by all odds the most common and most significant symptom in gastro-intestinal disease. It is the symptom which is most likely to bring the patient to the consulting room. It is a well established fact that need hardly be repeated that the musculature and mucosa are insensitive to ordinary tactile sensation. Yet we are not to assume that sensation is not appreciated in the stomach. Normally hunger, satisfaction, and repletion are the sensations experienced. It was long ago pointed out that one may trace

gradations between these normal sensations which represent physiological states and abnormal sensations such as hunger pain, epigastric distress and gnawing pain which connote definite pathological conditions. Such gradation of symptoms can often be brought out in studying the course of development of gastric disease. Volumes have been written in the present century regarding gastro-intestinal pain, as to whether it is viscero-sensory or viscero-motor, visceral or referred. Our present conception, I believe, is that such pain arises from a localized increase of tension in the gastro-intestinal musculature. However from a practical point of view we need not concern ourselves with these academic discussions. One must rather investigate and interpret this symptom with regard to its character, severity, location, radiation, duration, frequency, and, above all, its relationship to food and the presence or absence of periodicity in its occurrence. An analysis of the patient's history along these lines will go far towards establishing the diagnosis in diseases of the upper gastro-intestinal tract.

Time does not permit here of more than mere mention of these characteristics of pain. We are all familiar with the typical history of uncomplicated duodenal ulcer with epigastric discomfort or pain, seldom severe, and often described as a burning feeling, occasionally radiating up to the chest. The duration is usually over a period of years, occurring in attacks once or twice a year, often in the spring and autumn. The association of the onset of an attack with overwork or emotional disturbances, and the immediate relief obtained from the taking of food are strikingly common. Time spent in taking and retaking a careful history will clarify the picture in the differential diagnosis between peptic ulcer, chronic gall-bladder disease, and appendicular dyspepsia, even when physical examination, chemical and radiological investigation fail us.

The relationship of pain to the taking of food is of particular significance so far as gastric disease is concerned. One can generalize by saying that if the ingestion of food does not affect pain then the site of disease is either not in the stomach, or if it was in the stomach originally that it has spread beyond it. An example of the latter is the constant pain, radiating through to the back, existing independently of food, in a gastric ulcer which has involved the pancreas.

The severity of pain is worth enquiring into carefully. If the discomfort is enough to disturb the patient's sleep, and necessitates him getting out of bed to seek relief from the taking of milk or alkali, then likely that patient has organic disease and not nervous dyspepsia.

A change in the characteristics of the pain of gastric ulcer should make us think of the development of such complications as pyloric stenosis, hour-glass constriction, or the beginning of malignant change at the site of ulceration.

One need hardly mention the customary location and zones of reference of pain in ulcer, appendicitis or gall-bladder disease. We should remind ourselves however that pain in these conditions may occur in unusual situations. Thus the pain of duodenal ulcer may be felt in the left epigastrium and referred to the left lumbar region. Occasionally the pain from a diseased gall bladder shows itself in the left hypochondrium, and, as is more often recognized, the pain from chronic appendicitis may be located in the epigastrium.

8. *Nausea and vomiting.*—Nausea probably has its basis in an inhibition effect—an inhibition involving both gastric tone and gastric secretion. It is a common associate of anorexia but is not so commonly associated with epigastric pain. Nausea exists more often in the presence of extra-gastric disease than with gastric ulcer or cancer. It is frequent however in chronic gastritis, particularly on awakening, but is met with as a presenting symptom most often in the functional dyspepsias.

Vomiting, occurring apart from abdominal pain, can in most cases be put down as indicating that we are not dealing with organic disease in the stomach. It is a notoriously common symptom in the nervous dyspeptic patient. In the interpretation of this important symptom, three or four of its characteristics must be enquired into. One might mention the frequency, the quantity, the quality, the relationship to pain. Persistent vomiting over a fairly long period is the rule with pyloric obstruction. Occasional vomiting is suggestive of uncomplicated gastric ulcer or gastric cancer without complete pyloric obstruction. Occasional vomiting is often associated with chronic gall-bladder disease. The vomiting of

large amounts suggests long-standing pyloric obstruction. In uncomplicated gastric ulcer and in neoplasm the amount is usually small, unless we are dealing with a brisk hæmorrhage.

The quality of the vomitus should be enquired into, particularly as to the presence of blood and food residues. Gastric and duodenal ulcer head the list as causes of hæmatemesis, with neoplasm, either innocent or benign, and gastritis, as less frequent causes. Chronic follicular gastritis has come within recent years to be recognized as being almost constantly associated with repeated hæmatemesis. We must not overlook the fact however that chronic disease of the gall bladder and appendix may cause bleeding from the stomach. Vomiting gives relief from pain characteristically in gastric ulcer, and is, of course, often self-induced for this purpose. Little or no relief is obtained by emptying the stomach of the patient with gastric carcinoma.

Before concluding one should point out that practically all of the symptoms which have been discussed may occur in the absence of organic disease in the digestive tract. It is a familiar fact that the stomach behaves as a sort of alarm clock, often noisily proclaiming functional disorders which are due primarily to organic disease elsewhere. It therefore behooves the physician to carry out a complete subjective and objective examination of the patient before attempting to assess the significance of any digestive symptoms of which he may complain.

THE INTERPRETATION OF HEART SYMPTOMS*

BY H. N. JENNINGS, M.B.

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IN medicine there is an aphorism that symptoms precede signs. That is not usually true in disease of the heart, at least as regards symptoms that will bring a patient to a physician, or that have any significance for the physician. With modern methods of examination it is often possible to detect very definite disease or degeneration of heart and arteries before the functional efficiency of these organs has been sufficiently impaired to cause symptoms. One sees only an occasional patient with real impairment of function in whom abnormality cannot be found. These findings on examination, however, more often lead to an anatomical or pathological diagnosis than to a functional diagnosis. For the estimation of functional efficiency we have not as yet any signs or tests nearly so satisfactory as the subjective sensations of the patient when properly interpreted; except perhaps in congestive failure.

Unfortunately, heart symptoms are often garbled in the telling. Not without reason has the heart been considered the seat of the emotions. Many emotions cause disturbance of the heart's action, or sensations in the anterior chest which the patient refers to the heart. Most patients are badly frightened by sensations which they think indicate heart disease. The busy efficient person with responsibilities will often hide heart symptoms, while the sympathy-hunting neurotic will exaggerate real symptoms, and insist on many imaginary ones. It is often a tedious business, requiring patience and tact, to get an accurate version of the patient's symptoms.

There are three cardinal symptoms of heart disease — substernal pain, breathlessness on exertion, and palpitation. Other symptoms of heart disease are less definite and harder to evaluate.

Substernal pain.—The cause of pain from the heart is still in dispute, but evidence is accumulating in support of the theory that all heart pain is caused by insufficient blood supply to an area of heart muscle. Disease of the aortic arch probably causes no pain, unless by dilatation it presses on some sensitive structure. Aortic disease extending into the sinuses of Valsalva may partially or completely block the mouth of a coronary artery, reducing the blood supply to the myocardium, and so indirectly cause pain. Vegetations on the aortic valve may do the same. Incompetence of the aortic

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valve, by lowering diastolic blood pressure, reduces coronary blood flow, because it is during diastole that most of the coronary flow occurs. In the great majority of cases, however, the cause of the limitation of the blood supply to the myocardium is disease of the coronary arteries. This may be quite patchy in distribution, so that only small areas of heart muscle have reduced blood supply and the rest of the heart receives ample blood. Whether constriction of the coronary arteries, or failure of dilatation, due to abnormal nervous action, is ever a cause of pain has not been settled. Certainly in an occasional case vasomotor imbalance is strongly suggested clinically. It is interesting that severe anæmia in rare cases either causes, or assists in causing, heart pain. This suggests that the heart muscle, working without sufficient oxygen, may produce some abnormal substance which irritates the nerve endings.

The location of cardiac pain is usually rather vaguely described. The term precordial is commonly used, carrying the inference that pain from the heart will be felt in the area directly overlying the heart. Such is not necessarily the case. Pain from the appendix or gall-bladder is felt in the anterior mid-line of the abdomen, in the somatic segment from which these structures derive their sympathetic innervation. Only when overlying somatic structures become involved in the disease process is pain felt in the immediate vicinity of the diseased organ. This is the rule in visceral pain, and heart pain is no exception. It is located primarily in the anterior mid-line of the chest, in the first five thoracic segments, *i.e.*, under, or close to, the sternum. It is an accident of development that the heart is located under part of this area. If it were placed at some distance from its area of pain location there would be less confusion.

The pain is always diffused over a considerable area, in mild cases usually larger than the hand. As a general rule the more severe the pain, the larger the area covered. In many cases it spreads over more than half the anterior chest, to one or both shoulders and arms, more commonly the left, and to the sides of the neck or to the epigastrium. I have not seen a patient with the pain located primarily in the abdomen, about the heart apex, or in the back; but, in my experience, when the pain covers a large area, the patient may pick out a certain area for special attention, and it may require careful questioning to ascertain the primary pain area and the sequence of radiation from there. In a rare case the pain seems to start in the left arm, or in both arms, and travel to the chest.

Few patients are able to describe satisfactorily the character of the pain, and it seems to vary considerably in different individuals. Tightness, pressure, pulling, burning are terms often used in mild cases. In more severe cases the term "tearing" is common. The radiation to the arms is often more numbness than pain, and the radiation to the epigastrium, or even under the lower part of the sternum, is nearly always described as "gas".

A feeling of impending death in attacks seems to be rare, and not a real characteristic of the attack, but due, rather, to the patient's fear of the outcome. The same feeling occasionally occurs with pain from other causes, when it is believed to be cardiac pain.

It is very important to distinguish a simple anginal attack from coronary occlusion. Probably the feature of the attack most characteristic of angina is the relation to exertion or other causes of increased heart work. In mild cases only extreme exertion will cause the pain; in severe cases slight physical exertion, a large meal, excitement, or exposure to cold may be sufficient. But with most patients, the amount of stimulus required to initiate an attack remains remarkably constant from day to day. These patients know to within a few yards how far they can walk before pain will stop them. A few patients have attacks without apparently sufficient cause. These may be cases of vasomotor imbalance, or they may be emotional imbalance. Undoubtedly, in a few patients fear of attacks can initiate attacks. In my experience such cases are rare.

The duration of an anginal attack is rarely more than a few minutes. In milder cases the pain subsides rapidly when the exertion is stopped, usually within a minute or two. In more severe cases, where the attack may be initiated by excitement or an over-filled stomach, the cause is harder to control, and the attack likely to last longer. Fifteen minutes is a long time for an attack to last, and if the

pain persists for half an hour it is probably not angina, but may be coronary occlusion.

Examination of the angina patient may disclose much heart damage, or none. Usually there is some enlargement of the heart. About half the patients have hypertension. Most women suffering from angina have hypertension. Incompetence of the aortic valve, with low diastolic pressure and high pulse pressure, is occasionally found, usually in conjunction with marked enlargement. Luetic aortic disease is rare in our district. The electrocardiogram may show more myocardial damage than is made out clinically, and may strongly suggest a previous coronary occlusion. Congestive failure is not common.

The diagnosis of angina is made on the symptoms, and not on the findings from examination of the patient, though in doubtful cases finding evidence of heart disease makes angina more probable.

It is a mistake to give a serious prognosis because of angina alone. In the past most of the deaths reported as due to angina have been caused by coronary occlusion. Death may occur in an anginal attack, due to the onset of ventricular fibrillation, but this is probably very rare. Angina does not mean myocardial failure, though of course some degree of failure usually accompanies it; angina means that there is an area of heart muscle, perhaps quite small, which does not receive enough blood to cope with certain degrees of increase in heart work. When a serious degree of myocardial failure supervenes angina usually ceases. Skeletal muscle forced to work with restricted blood supply loses much of its contractile power before pain occurs. Clinical experience suggests that this is also the case with heart muscle, and that when a large area of the myocardium is receiving insufficient blood, the patient is stopped by breathlessness before he has exerted enough to cause pain. Prognosis should be based largely on other symptoms and signs, and the patient with mild angina, but with little evidence of myocardial failure, should not be restricted too much. With a little correction of his daily routine and habits he may remain useful for many years before heart failure or a coronary occlusion brings the termination. Too many of these patients are made invalids, to lead fretful useless existences, and probably die just as soon as they would have if allowed to be as useful as their disability permits.

Coronary occlusion is not a rare condition. Until recent years milder attacks were rarely diagnosed, and only the severe ones, with terrific pain and failure of circulation, were recognized. Perhaps this is largely responsible for the belief that many old occlusions, discovered post-mortem, have occurred without pain. The pain is not necessarily very severe, and does not differ from the pain of angina in location or character. The chief differences are the persistence of the pain, lasting from two or three hours to as many days, and the frequency of onset without apparent cause, as the majority of occlusions occur while the patient is at rest. The patient with an anginal attack which lasts more than half an hour should be observed closely for several days. Usually the suspicion of coronary occlusion will be confirmed by a drop in blood pressure, a slight rise in temperature lasting two days to two weeks, a mild leucocytosis beginning on the second day, and, occasionally, a precordial friction rub. Serial electrocardiograms are most useful in doubtful cases. In severe cases the rapid onset of heart failure or an abnormal rhythm are almost conclusive. It cannot be stressed too much that these patients should have a long period of complete rest. The scar replacing the infarct does not become strong in less than six to eight weeks, and may stretch, seriously impairing the efficiency of the heart. The severity of symptoms is not a reliable indication of the size of the resulting infarct.

The prognosis is based mainly on evidence of cardiac efficiency after the acute stage of the attack is over. Often it is necessary to wait two or three months before a worth-while opinion can be given.

There are many conditions which cause pain in the left chest, and frighten patients with the thought of heart disease. Crampy pains in the region of the heart apex are common from constipation. A gurgle of gas at the splenic flexure of the colon brings relief. Fibrositis occurs almost anywhere about the chest wall, and is common in the pectoral region. Pain from arthritis of the spine is more common in the lateral than in the anterior chest. Pleurisy and herpes may occasionally cause confusion.

Pericarditis is a rare cause of precordial pain. Usually it causes no pain. When pain does occur it is probably due to extension of the inflammation to the chest wall. The diagnosis is made by finding a friction rub, sometimes accompanied by enlargement of the area of cardiac dullness to the left and right of the heart and upwards to the left of the sternum. A complaint of precordial oppression, soreness, or mild aching pain is sometimes heard from patients with overaction, or irregular action of the heart. There may be tenderness of the chest wall. The cause in some cases may be the pounding of the heart against the chest wall. Neurotic persons complain of the same thing without any apparent cause.

Breathlessness on exertion is usually the earliest reliable symptom of a failing heart. It is also a symptom of anæmia, of chronic lung disease, of increasing weight, of advancing age, and of most debilitating conditions. In spite of this it is nearly always possible, usually without great difficulty, to decide definitely whether or not it is due to heart disease. Finding some abnormality of the heart does not decide the question. It is necessary to make a complete examination of the patient, to rule out other possible causes.

But breathlessness on exertion is not always the earliest symptom of heart failure. When the right heart fails first, or to a greater degree than the left heart, an earlier symptom is undue fatigue on exertion, with persistence of mild breathlessness for an unusual length of time following the exertion. Actually the degree of breathlessness during the exertion may be less than normal. When the heart is normal, strenuous exertion causes an increased velocity of blood flow through the lungs, giving less time for interchange of gases between blood and alveolar air, and so the blood leaving the left heart contains more carbon dioxide and less oxygen than normal. This blood, on reaching the medulla, stimulates the respiratory centre, and increased breathing results. A failing right heart will not achieve as great a velocity of blood flow through the lungs as will a normal heart, with the result that the blood leaving the left ventricle is better aerated, and does not cause so great an increase in breathing. However, the failing heart sends less blood to the working muscles. More than the normal amount of lactic acid is formed because of the relative lack of oxygen, resulting in quick muscle fatigue. Also an abnormal oxygen debt is created, which must be paid by long continued increased breathing after the exertion ceases.

This syndrome is common in heart failure resulting from chronic lung disease, such as pneumoconiosis, and emphysema from chronic bronchitis or asthma. In many of these cases there has been some shortness of breath for many years due to the lung condition, and the heart failure is not recognized until œdema has developed. There are many other cases in which primary right heart failure is not so definite, but in which muscle fatigue antedates breathlessness. These are usually not seen by a physician until undue breathlessness is occurring, but a clear history of preceding fatigue can be elicited.

When the left heart fails first, or to a greater degree than the right heart, breathlessness is an early symptom. The right heart pumps blood into the lungs faster than the left heart is able to carry it away, and the lungs become engorged. The thickened, œdematous alveolar walls obstruct the interchange of gases between blood and alveolar air, and the air content of the alveoli is also reduced. Poor aeration of the blood results in marked increase of breathlessness on exertion. There is also abnormal muscle fatigue because of decreased blood flow and decreased oxygen content of the blood going to the muscles, but the patient rarely mentions this. The breathlessness occupies his attention.

Mitral stenosis, by damming back blood in the lungs, causes the same condition. However, some myocardial damage always accompanies mitral stenosis, and it is difficult to evaluate their respective effects when the patient becomes short of breath.

A few patients develop advanced left heart failure while the right heart remains fairly efficient. These are the patients who become breathless at rest, and develop œdema of the bases of the lung, and even pleural fluid, with little or no œdema of the legs. If they survive until the right heart fails under the high pulmonary blood pressure they get considerable relief from breathlessness, and the œdema mounts rapidly up the legs to the abdomen and back. The lungs may become entirely clear of moisture while the chest wall is becoming

œdematous. This is occasionally seen near the termination of rheumatic heart disease.

Primary left heart failure is common. It is the usual thing with hypertensive heart disease and aortic valve disease, and common with coronary artery disease, chronic hyperthyroidism, and rheumatic heart disease.

Cardiac asthma, a paroxysmal dyspnœa occurring usually when the patient is resting, is particularly interesting because it still is not satisfactorily explained. The recumbent position is an important factor in its development. The patient can usually escape attacks by spending the night in an easy chair, but if he lies down he will be wakened by severe dyspnœa. In severe cases the lungs become very œdematous and may fill with frothy fluid. Occasionally death occurs in an attack. Assuming the upright position usually gives relief from a few minutes to an hour. Morphia may be needed. Limiting exertion during the day helps to ward off attacks, though many of these patients have fair exercise tolerance. The condition occurs mainly in patients with hypertensive heart disease and aortic valve disease. Quite a number have deficient kidney function.

One sees a few patients who complain of breathlessness, but in whom no heart defect or other cause can be found. They have dyspnœa on moderate exertion, tire very easily, complain of palpitation, and the heart rate is too fast. In the cases which follow acute infections, particularly influenzal attacks, the electrocardiogram may show low voltage, though nothing else is found on examination. Such patients will recover with a period of rest followed by graded exercise. In other cases finding and removing a focus of infection brings about rapid recovery. But there are still some in whom the cause remains unknown. During the war they were treated with fair success by the use of graded exercises. This is difficult to manage in civil life, but should be tried.

A few patients complain of attacks of breathlessness not related to exertion, and, if observed during an attack, the breathing is seen to be sighing in character, or rapid, shallow, and obviously forced. Such patients usually show other evidence of mental instability.

Palpitation is a symptom that depends very largely on the mental type of the patient. Some patients, when tired or feeling sorry for themselves, are conscious of heart action, though their hearts are behaving quite normally. Other patients are not conscious of their hearts during an attack of paroxysmal tachycardia. The symptom normally occurs with excitement, and during and following strenuous exertion. Paroxysmal tachycardia, paroxysmal auricular fibrillation or flutter, or marked over-action of the heart, as in hyperthyroidism, are common causes. Extra-systoles, flatulence, or an overfilled stomach, are sufficient causes with a few patients. One of the most important causes, and perhaps the one most often over-looked, is the toxic myocarditis following acute infections.

The onset of over-action or irregular action of the heart usually is noticed by the patient. Chronic conditions of the same kind usually do not cause the complaint of palpitation. The patient complaining of palpitation should always have a careful examination. Serious damage to the heart may be present with no other complaint. More often no damage is present, and the physician is then in a satisfactory position to reassure his patient.

BCG VACCINATION IN WESTERN EUROPE.—C. G. Kayne (*Am. Rev. of Tuberc.*, 1936, p. 10) gives a useful review of the employment of BCG in the prophylaxis of tuberculosis. The general conclusions he reaches are similar to those already arrived at by Irvine (see *Brit. M. J.*, 1934, **2**: 773). From a consideration of the results obtained on human beings and on animals it is concluded that BCG produces only a very partial immunity, which is effective only if the vaccination is combined with other methods of prophylaxis. Stress is laid (1) on the need for standardization of the vaccine; (2) on its administration by a route, preferably the intracutaneous, which will ensure that all the organisms in the vaccine come into contact with the tissues without giving rise to too severe a local reaction; (3) on the choice of a dose that will produce tuberculin hypersensitiveness as rapidly as possible with the least inconvenience; and (4) on the protection of vaccinated subjects from exposure to tuberculous infection until a positive tuberculin reaction has developed. In this and in most European countries it is believed that BCG vaccination should be restricted at present to infants and children in contact with tuberculosis in their homes, though the vaccination of tuberculin-negative adults who are likely to be frequently in contact with tuberculous patients, such as nurses and medical students, must be considered.—Abs. in *Brit. M. J.*

THE TREATMENT OF WAR WOUNDS IN FRENCH HOSPITALS*

BY MAJOR J. L. PETITCLERC, R.C.A.M.C., O.C.

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IT is not intended in this paper to bring forward all the different methods of treatment of war wounds during the World War. Army doctors must, at least in part, be held responsible for the numerous mistakes that took place at the beginning of hostilities. Up to the declaration of war it was the accepted teaching and prediction that, owing to the tremendous speed of the modern projectiles, only sterile wounds would result. Everybody knows what actually happened. When the medical writers were thinking of rifles and bullets, it was trench warfare that took place with its horrible wounds.

Human ingenuity and experience having in a relatively short space of time transformed, for instance, the pre-war aeroplane into a huge fighting machine, undreamed of before the last war, so they have also modified and transformed the treatment of wounds and the wounded. For example, it was the universal rule to send the wounded to a base hospital far back from the actual theatre of action, whereas a few years later exactly the opposite procedure was taking place. Small surgical installations, equipped for and capable of doing any kind of operation, were being sent to the wounded in the very first lines of trenches, the idea being to get hold of the situation before that most dreadful and dangerous foe of the wounded soldier, wound infection, had had time to entrench itself and fortify its position.

War wounds may be considered in three different aspects: (1) the primary period, *i.e.*, the period of the first dressing; (2) the secondary period, *i.e.*, the period of evolution of the wounds; and (3) the late period; cicatrization is complete, but there persist mutilations, vicious scars, etc., that must be repaired or adjusted.

The primary period.—It is easy to understand that treatment will of necessity be different if the wound concerns only the skin or the skin and the underlying soft tissues, or the blood vessels, or again the nerves or the bones and joints.

Perhaps it is not out of place to insist here on the fact that a war wound, no matter how clean and regular it appears, must never be closed or sutured completely; I am not even sure if that last word should not be erased altogether. And, naturally enough, before suturing a wound disinfection comes to one's mind. Disinfection, that is where the imagination has had its free movements and where the antiseptics, old and new, have been tried, boasted of, discarded, tried again, the ultimate results depending in almost every case on the skill, ability and devotion to duty shown by the surgeon. Therefore, if the wound involves only the soft parts without any injury to the important structures, one of two things must be considered: (*a*) if the wound is small, neat, regular, or, again, if it appears in the form of a narrow sinus, the less you interfere with that wound the better, probably, if in your mind you are satisfied that no vital or important organ has been touched. (*b*) If the wound has a large sinus with ragged edges there is a chance that the projectile has carried with it some portion of soiled clothes, etc., and the tissues, being badly contused and stunned, offer no resistance to the infection; that kind of wound or sinus must be opened and cleansed. No sinus should be explored with a probe or a finger; it must be opened with the knife and scissors or else left alone.

If there is an important vessel on the track of the projectile, the hæmorrhage, external or internal, the latter characterized by the rapid increase in the size of the limb, will call for an immediate ligature of the bleeding vessel, the ligating of the vessel being done in the wound itself after enlarging it as much as necessary to expose the bleeding point. The clots and débris being removed, care must be taken to seize the vessel alone; in some rare instances a suturing could be done.

A nerve lesion, if it involves an important nerve, must be repaired as soon as possible,

* Read by title at the Sixty-seventh Annual Meeting of the Canadian Medical Association, Victoria, B.C., Section of Military Medicine.

provided there is no infection, or as soon as possible after the infection has disappeared. The same rule applies to the tendons.

In fracture cases, if there is only a narrow sinus without loss of substance in the soft tissues, the wound will be treated as if there was no bone injury—no probing, no exploration of any kind to be allowed. If the bony lesion is a complication of a large wound with loss of substance in the soft tissues, we must: (1) disinfect the wound thoroughly; (2) remove the bony splinters that are completely free, care being taken not to remove the bony fragments that are still adherent to the soft parts, to prevent a possible pseudoarthrosis; and (3) immobilize the part as completely as possible.

When the track through or in a joint is narrow and clean its openings must be disinfected, but exploration is absolutely contra-indicated. On the contrary, if the articular wound is large, a thorough disinfection must be done, but no fragment of cartilage or bone is to be removed unless entirely free.

Now, sometimes a wound of a limb is such that it seems to justify amputation. If there are still present some blood vessels and the principal nerves every effort should be made to preserve the limb. It is only when the soft parts have been suppressed and the bone smashed and the limb hanging only by a few shreds of contused tissues that a primary amputation is allowable. Primary amputation is permitted only when the surgeon knows that the limb cannot live. The kind of amputation, typical or not, depends on a good many circumstances—the condition of the patient, the presence or absence of infection, the operative and post-operative facilities, etc.

Every skull fracture, provided the surgical installation is sufficient, calls for trephining. If there is a foreign body, it should be left alone, unless it is discovered during the process of operation; it must not be looked for.

Penetrating wounds of the chest wall may present the urgent problems of hæmorrhage or dyspnœa. If the hæmorrhage does not stop by itself, which is frequently the case, or if there is a hæmothorax and increased dyspnœa, a thoracotomy might be done; many ribs at the site of penetration should be resected in order to expose the pulmonary wound.

A penetrating wound of the abdomen calls for an immediate laparotomy, and a laparotomy to be successful requires three conditions: (1) a surgeon who can do it; (2) a location where it can be done; (3) a patient who can stand it.

The secondary period.—The primary period is over and the wound will evolve towards its cicatrization, with or without suppuration. Dressings will have to be done. If there is inflammation, moist dressings, daily, or even five or six times a day, depending on the degree of inflammation, will have to be resorted to. If there is no inflammation, dry dressings are to be used. It is probably more harmful to the wound to change a dry dressing too often than to leave it too long.

When there is no suppuration, antiseptic powders or salves may be used with advantage, in that they prevent the sticking of the dressing to the wound. It is useless and harmful to pack a narrow sinus with wicks of gauze.

In this secondary period of the treatment of war wounds of the limbs one thing in particular must be kept in mind, and that is the repercussion that the wound will have on the function of the limb. For instance: an insignificant sinus through the calf of the leg may bring an immobilization of the foot in extension that will be a handicap to the patient for a long time; hence the importance of watching carefully the position and functions of the wounded limb. Immobilization being the best means of preventing inflammation in a fractured limb, every effort should be made to establish it as completely and in as good a position as possible. The same rule is applicable to articular wounds; nevertheless the Belgians reported wonderful results by using instead active and passive movements.

Any foreign body will be left alone until after the healing is completed, for there is a real danger of waking up a latent infection. If however the foreign body is the cause of the persistance of a fistula, it stands to reason that it must be removed. Nerves and tendons must not be sutured during this period before every trace of infection has gone.

Many wounds, although very correctly treated in the primary period, will get inflamed about the third or fourth day. A localized inflammation offers no special indica-

tion; moist dressings will usually be all that are necessary. If in spite of a good drainage, moist dressings, etc., the patient's condition is getting bad, amputation will have to be resorted to. In a general way, it is not the local condition of a limb that will force the surgeon's hand, but the condition of the patient, and the surgeon must not wait too long. Sometimes the inflammation, instead of being localized, is diffused and requires very energetic treatment. If no quick results are showing one must not hesitate; amputation is the only procedure that can save the patient's life. These remarks apply with special force to gas gangrene.

Around the eighth to the fifteenth day, or even later, one may meet with secondary hæmorrhages serious enough to endanger the patient's life. If the hæmorrhage is due to the ulceration of a vessel that can be reached, one must not hesitate; the bleeding vessel must be ligated or clamped. An alternative will be a good packing with gauze, with gauze and antitetanic or antidiphtheritic serum, and calcium chloride. Blood transfusion finds here one of its best indications.

In a case of meningitis following a fracture of the skull, medical treatment is the only resource if a previous trephining has been done. The chances for success of this operation are very remote if it is done only at this late period.

Laparotomy and drainage might be tried for peritonitis following a penetrating wound of the abdomen.

A fæcal or urinary fistula offers no special indication. The surgeon must not be in a hurry; kind Nature will very often, in its own way, bring the desired results.

The late period.—Every projectile, if its extraction is not dangerous for the patient, should be removed if its size justifies it. These foreign bodies are liable to excite a chronic inflammation or else play on the bearer's mind. This late period has otherwise no differentiation from civilian surgery; vicious scars, aneurysms, muscular retractions, etc., here will come to mind.

Case Reports

A CASE OF OSTEOMYELITIS WITH PURULENT PERICARDITIS

By M. Folinsbee Newell, M.B.

Edmonton

This is the report of a case of osteomyelitis with purulent pericarditis in a boy fourteen years of age. The pericarditis was treated by repeated aspirations and the osteomyelitis without surgical interference. In the literature available to me I was unable to find any case combining both lesions in which there was recovery. Among the four fatal cases reported by Abt[1] there is mention of a similarly combined lesion but without further data.

Case Report

C.W., a white boy, aged fourteen years, was admitted to the Royal Alexandra Hospital, Edmonton, on March 6, 1933, complaining of pain in the right chest. In 1929 he had been kicked by a horse on the right lower leg. A discharging sinus for three or four months resulted, but cleared up readily after proper drainage. In 1931 the appendix was removed, with normal recovery. Two weeks before admission to the hospital the patient had a boil on the back of his neck which was opened and healed apparently normally. Three days before admission there was exposure to cold and wet. Twenty-four hours before admission the boy complained of pain in the right chest, which was aggravated by deep breathing, but otherwise he felt fairly well.

The patient was a well developed and fairly well nourished boy who did not look ill. A friction rub was heard in the right lower chest anteriorly over the region of the pain; otherwise the physical examination gave negative results. The temperature was 104°, the pulse rate 140, and the respirations were 24, on admission. The white blood cell count was 20,000, with 82 per cent polymorphonuclear neutrophiles, 14 per cent lymphocytes, and 4 per cent monocytes. The urine analysis and blood Wassermann were negative.

March 7th.—The patient was not so well as on the previous day. Following a chill the temperature rose to 105.2° F. by mouth; the pulse rate was 130; and the respirations 30. The findings of the chest examination were similar to those of the previous day, with apparently no further involvement of the lung. The urine showed a faint trace of albumin, otherwise gave negative results.

March 8th.—The patient complained of pain in the left ankle and left knee, and did not feel so well.

March 9th.—Although the pain in the chest was subsiding there was increased pain with slight swelling and tenderness of both ankles and both knees.

March 10th.—The condition of the patient became progressively worse. The temperature remained between 104 and 105° F.; the pulse rate varied between 110 and 140; and the respirations between 20 and 24. A swelling which looked, on account of its location, like a developing mastitis on the right side occurred. (In the light of the after-findings of the case this proved to be the outward manifestation of an underlying osteomyelitis of the rib.) The knees and ankles were still painful and slightly swollen. Marked pain and tenderness were complained of in the right inguinal region.

The blood culture was positive for *Staph. albus* in 24 hours.

March 12th. — The roentgenogram of the chest showed the right costo-pleural angle obscured. This shows more clearly at a later date, March 28th (Fig. 1). March 16th.—The patient was acutely ill. Repeated chest examinations had failed to reveal any pneumonic lesion. An abscess about the size of a walnut which had developed on the scalp was opened and drained. March 17th.—The condition of the patient was very poor. Electrargol, 5 c.c., was ordered to be given intravenously daily for one week.

March 20th.—For the first time since admission there seemed to be some improvement. The temperature had dropped to 102°, the pulse rate to 104, and the respirations were 20. The mass on the right chest had increased in size, becoming more elongated, following the direction of the underlying rib and apparently attached to it. On examination with an exploratory needle we obtained a small amount of pus. The culture of the pus was positive for *Staph. albus.*

March 25th.—The blood culture was still positive for staphylococcus. The white cell count was 14,500.

March 28th.—The patient looked very pale and complained of general discomfort with precordial pain. The heart sounds were muffled and the cardiac dullness was greatly increased. The roentgenogram of the heart showed a markedly enlarged pericardial shadow (see Fig. 1). The mass in the right chest, shown also in Fig. 1, was incised, drained and about an ounce of pus was obtained.

March 29th.—About nine ounces of thick greenish yellow pus were aspirated from the pericardial sac. The needle was inserted into the fourth interspace about 2 cm. from the left border of the sternum. The culture of the pus was positive for *Staph. albus.*[2] March 30th.—The patient was more comfortable, the colour improved, and the precordial pain had disappeared. The right leg showed increased tenderness and firmness over the upper end of the femur in the region of the inguinal glands. The right ankle was still swollen and tender, especially above the external malleolus. March 31st.—A diagnosis of osteomyelitis of the upper end of the right femur and the lower end of the right fibula was made, but the patient was so acutely ill that we decided against surgical procedure. The roentgenograms of the right and left leg were negative at this time.

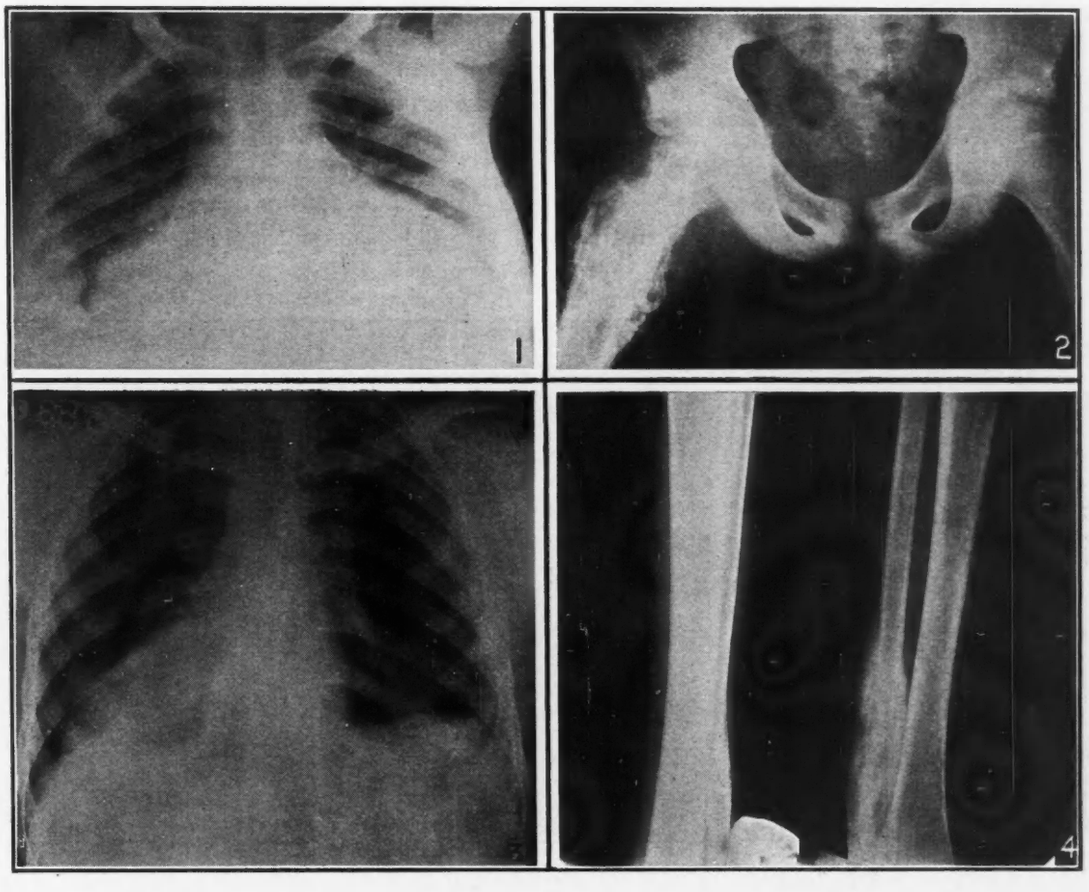
April 3rd.—Although the temperature gradually dropped to normal the general condition of the patient showed very little improvement. The chest sinus and scalp abscess continued to drain freely. April 7th.—The urine showed a faint trace of albumin and a trace of pus. The blood culture was sterile in forty-eight hours.

May 17th.—From March 29th to May 17th there were six pericardial aspirations in which a total of 167 ounces of purulent fluid was removed. Gentian violet was instilled after each pericardial aspiration. May 21st.—Except for fairly constant pain in the right leg the patient had gradually improved.

June 16th.—(See Fig. 2). The roentgenogram shows osteomyelitis of the right femur. The right fibula at this time also showed an osteomyelitis of the lower third. June 26th.—During the last week the temperature dropped to normal.

August 25th.—See roentgenogram of the heart (Fig. 3).

During August and September there was gradual improvement. The patient was up and about the ward in a wheel chair. The right hip had become fixed in slight flexion. October 30th.—(Fig. 4). The roentgenogram showed osteomyelitis of the right fibula. During November and December the patient continued to improve, and was discharged from hospital on January 13, 1934. At this time he was getting about on crutches and had commenced preliminary exercises to increase movement in the hip joint. The roentgenograms of the



femur and fibula, on discharge, showed marked improvement in the bone. The heart condition was also greatly improved.

Since discharge from hospital the patient has continued to improve. Movement in the hip joint increased and for the last year he has been riding a bicycle and carrying on a normal active life.

COMMENTS

1. The instillation of gentian violet into the pericardial sac may have had a favourable effect.

2. With regard to the treatment of purulent pericarditis, my findings in this case are at variance with the views expressed by Shipley and Winslow,[3] that "If unrecognized, purulent pericarditis kills the patient. The patient in whom the condition is diagnosed and who is treated expectantly or by therapeutic aspiration fares no better."

3. Conservative treatment of the osteomyelitis was probably the most important factor in the successful termination of this case.

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A REPORT ON TWO CASES OF ROCKY MOUNTAIN SPOTTED FEVER

BY F. W. GERSHAW

Medicine Hat, Alta.

Cases of Rocky Mountain spotted fever are common in north-western United States, but very few have been met with on the Canadian side of the line. It would seem desirable, therefore, to give a brief account of two that have occurred in Alberta.

The patients in question were men about sixty years old, both of whom had been frequently bitten by ticks during the spring and summer. One man recovered and the other died. The signs and symptoms were much the same in both cases — namely, drowsiness, headache, backache and anorexia for four days; flushing of the face, congestion of the eyes, and a coated tongue. A rash appeared after the fourth day, consisting of dusky red spots about one-third of an inch in diameter scattered all over the body, except the soles of the feet and the palms of the hands. The temperature, with morning remissions, rose to 103° in the afternoon. Low muttering delirium, incontinence of urine and fæces, and inability to move developed and the patients were for days in a comatose state. The man who recovered began to improve on the seventeenth day and by the twenty-seventh day was up and about, but the rash still persisted, though it had faded to some extent. In the man who died the spots became hæmorrhagic, confluent, and irregular in outline, measuring in some cases three-quarters of an inch across. Death occurred rather suddenly on the fifteenth day. Strips of skin were sent to be examined but no *Rickettsia* were found. This would exclude typhus, though, clinically, typhus cannot be distinguished from Rocky Mountain spotted fever. Wassermann and Widal tests were negative.

PITUITARY CACHEXIA

BY D. M. BALTZAN, M.D., F.R.C.P.(C.)

Saskatoon

Emaciation is a symptom in the course of many diseases. In rare instances it assumes major proportions and may then constitute the main issue. When extreme leanness is reduced to the last analysis the diagnosis is not very difficult. This applies exactly to the girl shown in Fig. 1 on the first day of examination, November 9, 1935.

Fig. 1

Fig. 2

CASE REPORT

The complaints stated in order were: stomach trouble for one and a half years; weakness; dizziness; drowsiness; and progressive loss of weight. Weakness had existed for two years. Even in her condition when seen the patient was still ambulatory but had to rest a lot. She frequently fell asleep during school hours owing to uncontrollable drowsiness and fatigue. Flatulence and eructations followed meals, and constipation was progressively more obstinate. She had had one bowel movement a week. Occasionally abdominal cramps bothered her, but never nausea or vomiting. Anorexia was practically complete, and if ever she had any desire for food it would be at mid-day only. The stools were not noticeably different. Dizziness was always most marked after food and not before. Menstruation started at 14, and occurred at regular intervals five or six times subsequently. But for one and a half years since the onset of the debility the menses were entirely suppressed. Within the past year it is estimated that there had been a loss of 30 pounds in weight.

On close questioning the patient recalled a mild, brief, preceding febrile period which had passed almost unnoticed. Childhood illnesses included scarlet fever at six years of age, measles, mumps, whooping-cough, and small-pox, without resulting evidence. The family history was good and with the benefit of a healthy French descent.

Physical examination.—The patient was 16 years of age; height 4 feet 10 inches. Her weight was 48 pounds, which is considerably less than one-half her expected weight. Emaciation was the striking feature. Mentally clear, she was cooperative but acted slowly. The skin was very dry, wrinkled, with loss of recoil elasticity. In some parts there was a brownish pigmentation. The loss of subcutaneous fat was uniform over the whole body. The muscles were flabby, reduced in bulk, and atrophic. There was no paralysis. The eyes were prominent, set deep in the sockets; no glassy stare; and no exophthalmos. It was not opportune to demonstrate this in the photograph taken on first acquaintance. The teeth, mouth, throat and sinuses were healthy. The thyroid gland was palpable, firm and irregular; no tremor or tachycardia. The heart was normal on physical examination, and, radiographically, was of a distinctly small, atrophic type. Blood pressure, 95/45. Lungs clear. Abdomen negative. All nervous reflexes were equal, never very brisk, except the knee jerks, which did not respond at all, probably because of muscular atony.

Laboratory examination.—Blood tests: hæmoglobin, 75 per cent; red blood cells, 3,750,000; white blood cells, 9,900. Polymorphonuclears, 76; lymphocytes, 17; eosinophiles, 2; monocytes, 5; red blood cells normal in size and shape. Blood sedimentation rate, normal. The blood Wassermann test was negative. Blood agglutinations, negative. Creatinine, 1.5 mg. per 100 c.c. of blood. Urinalysis, negative. Creatinine excretion, 1 mg. in twenty-four hours. Basal metabolic rate (unsatisfactory) plus 35, and, later repeated, minus 2. Test meal: free HCl, 22; total acid, 37; mucoid and of finely granular consistency. Skiagrams of the following parts were all negative; skull, chest and gastro-intestinal tract. Intracutaneous tuberculin test was negative.

The treatment first instituted was carried on without variation for six weeks. The procedure was simple, *i.e.*, (1) antuitrin S, one ampoule, 100 units, daily; (2) insulin up to 15 units before food; (3) Tr. Belladonnæ, to reduce vasospastic griping that occurred after eating and to combat constipation, which was regarded as due to the same mechanism. The temperature for the first five days was subnormal; subsequently it was always subnormal in the forenoon, with a maximum mean rise of 99° F. on various days. Her weight increased rapidly. At the end of six weeks her weight had doubled, 96 pounds (see Fig. 2). Medication was discontinued. Eight weeks later her weight was 105½ pounds, a gain of 9½ pounds during this longer period, as against 48 pounds in the previous six weeks with treatment. The constipation was entirely corrected. Menstruation did not recur, and no results were obtained from theelin-in-oil, 1,000 I.N.U., daily for only two weeks. The general response to the management is probably better demonstrated by comparing the illustrations than it can be by description.

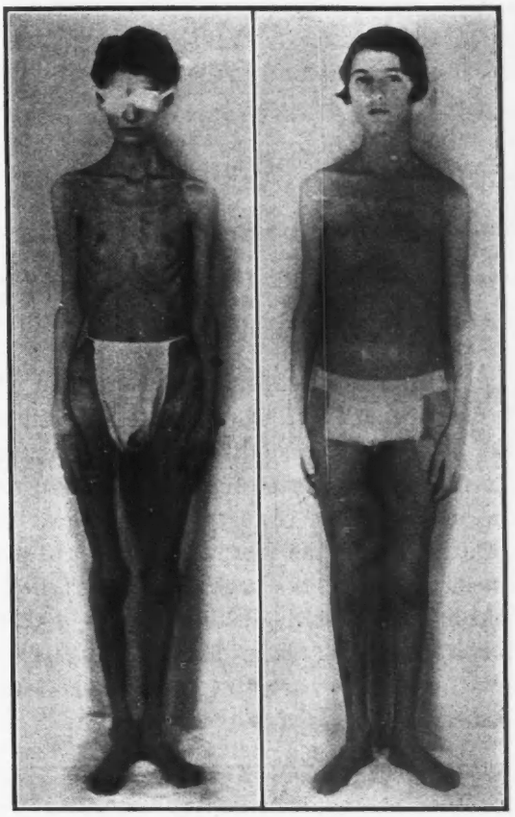

Fig. 1 Fig. 2

COMMENT

Pituitary cachexia takes time to develop and is not suddenly precipitated. At any time in the course of events the clinical picture is necessarily atypical, compared with the classical appearance in the late stages characteristic of Simmonds' disease. When diencephalopathies, anterior hypophyseal disturbance, and pluriglandular failures are considered as components in the distribution of the pathological process, a wide variety of presenting features may be expected, especially in the intermediary stages. The diagnosis is never a satisfying one, because of inadequate criteria. As a working diagnosis in the suggestive case on the other hand it may be made with less hesitancy. In the case cited the procedure first excluded all other causes as far as possible, and the diagnosis was further prompted by evidence of a preceding mild febrile period, the general appearance, weakness,

lethargy, and progressive loss in weight, corroborated later by the remarkable rapid response presumably to the treatment outlined. Indications that serve to recall the diagnosis of pituitary cachexia are—loss of weight, premature senility, inelastic parched skin, amenorrhœa, impotence, hypothermia, metabolism, and water-balance disturbance, mental lethargy, somnolence, loss of pubic and axillary hair, and other less pathognomonic signs.

EPITHELIOMA ADENOIDES CYSTICUM

(REPORT OF TWO CASES)

BY JOHN CHRISTIE

Vancouver

These two cases conform very closely to text-book descriptions, but are submitted on account of the rarity of the condition and the pictures which fit in so well with the descriptions.

The nodules vary from pin-head to pea size, are scattered over the face, and a few are present on the sides of the neck. The surface of a nodule is smooth and glistening, with a translucent appearance. The larger ones have a yellow tinge. They are quite firm to the touch. The distribution is fairly symmetrical. The nodules are most abundant in the naso-labial folds where, in the case of the mother, they have coalesced into irregular masses. They are also abundant on the chin and forehead. No. 1 is a son of patient No. 2. There is in the family one other child, a daughter, who is 18 years old and has not shown any lesions. Familial connection of cases is common.

CASE 1

Male, aged 20. The lesions began to appear 7 years ago and have gradually increased. Only during the past year have they appeared on the forehead. They never ulcerate, never disappear spontaneously, and produce no symptoms (Fig. 1).

CASE 2

Female, aged 39. Duration 18 years. The lesions are much larger and more closely packed than in Case 1, but otherwise are the same. They are present on the cheeks and side of the neck. The woman has a large nævus flammeus on the left side of the neck, but no other congenital abnormality is present in either case (Fig. 2).

A nodule from Case 2 was submitted to a pathologist and the following report was received.

"A number of sections were taken through the small bit of skin and show a rather thinned stratified squamous epithelium beneath which are very coarse cords of squamous epithelium, many showing central degeneration and, practically, cyst-formation, and surrounded by finer cords and nests of basal cells that are rather atypical and more hyperchromatic than normal. In the larger masses of these basal cells there are lighter-staining cyst-like areas, and there is a fairly deep infiltration of these cellular masses into the underlying tissue, although the borders or periphery of the larger masses are fairly regular. *Diagnosis.*—Epithelioma adenoides cysticum."

Fig. 1

Fig. 2

AN UNUSUAL CASE OF EXTRA-UTERINE PREGNANCY*

BY W. W. LAILEY, B.A., M.D., F.A.C.S.

Toronto

Mrs. M., aged 35, para-III; grav-V, was admitted to the Burnside Hospital on February 1, 1936, because of a dark, blood-stained flow and abdominal pain. She first gave a history of having had her menstrual periods regularly until August, 1935. She also thought that quickening was felt the latter part of July or early in August. From August until November she felt perfectly well; then she began to feel vague aching pain in the abdomen and general malaise. At this time, also, she began to have spotty, vaginal bleeding. The doctor who was then called to see her thought that the pregnancy was about six months advanced, and advised her to remain in bed because of the bleeding. This advice was followed, and the patient was in bed from November onward to the time of her admittance to the hospital. The spotty bleeding continued, and the abdominal discomfort gradually increased.

Upon admission to the hospital, a general physical examination was negative. There was no evidence that labour had begun. The blood pressure was 128/80; urinalysis negative; red blood cells, 3,300,000; hæmoglobin, 30 per cent. The abdomen was tense, with what seemed like a large baby. Faint heart sounds were heard in the lower left quadrant, and fetal parts could be palpated in the upper abdominal zone. The position of the baby was difficult to determine exactly. There was obviously a vertex presentation, however. When a vaginal examination was made, the head was felt bulging into the vaginal vault at the level of the mid-pelvis. The intervening tissue between head and vaginal mucosa felt fairly thin, and the sutures and fontanelles of the fetal head could be distinctly palpated. The posterior vaginal fornix was completely obliterated by the downward retention of the head, but there was a narrow space in front into which the finger could with difficulty be inserted. The cervix could not be felt, neither did any portion of the vaginal vault, when examined with a speculum, show any opening or dimple suggesting the cervical os.

Having learned these facts, the problem seemed to be, first, to locate the position of the cervix, which, we thought, might be high up in the space beneath the symphysis pubis and in front of the baby's head. To do this it was necessary to anæsthetize the patient, and at the same time, have her prepared for an abdominal section, because I felt that should labour begin the uterus would likely rupture. The cervix was, with difficulty, reached at the level of the sub-occipital region of the baby's head. The abdomen was opened by a midline incision. The uterus was the size of a three months' pregnancy, and a thin-walled sac enclosed the large baby, which was lying intra-abdominally outside the uterus.

This sac was opened in front. It contained a very small amount of fluid. The baby, weighing eleven pounds, one ounce, looked over-mature. The placenta began to separate partly, as soon as the baby was delivered, and the bleeding was so severe that at first the situation looked hopeless. Pressure on the abdominal aorta appeared to control some of the hæmorrhage, while the remaining part of the placenta was separated from the back of the right broad ligament and the posterior surface of the uterus. The bleeding lessened somewhat, but there were so many bleeding points that it was necessary to remove the uterus with the right tube and ovary, and as much of the sac wall as could be resected. The posterior surface of the sac was too closely adherent to the bowels and peritoneum to attempt removal. The blood vessels in the sac wall were numerous and extremely hypertrophied.

An intravenous saline injection was started during the operation. The condition of the patient was fair at its conclusion. The systolic blood pressure was 130; pulse, 134. The baby cried lustily about five minutes after delivery. The only apparent deformity was a club foot, due to the cord being wound twice around the ankle. The baby for a few days had an elevation of temperature. At the time of recording, the weight is increasing, and the infant is developing like any normal newly-born.

The mother's post-operative course was complicated by her anæmia, which required a blood transfusion of 500 c.c. Also, the membranous tissue which was, of necessity, left in the abdomen caused a vaginal discharge and a febrile convalescence. During the past three or four days (March 1st, onward), while there is still some discharge, the temperature has been normal. On May 4th the patient was up for the first time and seemed to be well on the road to complete recovery.

Upon admission, the mother gave the date of her last monthly period as the end of July or the first part of August, but later it was found that there had been some bleeding in April, May and June, accompanied by severe lower abdominal pain, that "doubled me up", as she expressed it. These attacks of pain must have been connected with the rupture of the original sac, and, therefore, conception would date from March or April, 1935.

The operative procedure was different from that which experience has proved to be safer in most abdominal pregnancies. Usually it is better to leave the placenta adherent to its surrounding structures after cutting the cord short, and to close the abdomen without drainage. When, as often happens, the fetus dies before operation it is well to wait for six to eight weeks in order to allow the placental vessels to thrombose before removing. The partial spontaneous separation of the placenta in this particular instance made it imperative to separate the remainder, and, in order to control hæmorrhage, to remove the uterus as well.

There are some remarkable features in connection with this pregnancy apart from the fact that ectopic gestations seldom continue their development after rupture. This baby developed in its unusual position to term, and then four or five weeks beyond the usual expectancy; again, both the mother and her baby survived, and are practically normal at present, one month later; finally, the implantation evidently began in the ovary, which, the pathological report by Dr. Nelson D. Henderson will demonstrate. This report runs as follows.

"Uterus is diffusely enlarged to the size of a 2½ month pregnancy. The serosal surface is free from adhesions. The left tube and ovary appear normal. A large full-term placenta 21 cm. in diameter, and 7 cm. in greatest thickness lies between the 2 layers of the

* Read before the Section of Obstetrics and Gynæcology, Academy of Medicine, Toronto, March 5, 1936.

right broad ligament, with maternal surface covered by the peritoneum of the broad ligament. The right utero-ovarian ligament runs into the serosal surface of placenta and the ovary as such has disappeared. Repeated sections taken through this area fail to reveal either gross or microscopic evidence of ovary. The tube is stretched over placenta. Wall is delicate in structure, grossly appears normal, and fimbriated end is patent and free. The thin delicate mesosalpinx can be demonstrated throughout the length of the tube. It is transparent and undamaged. The fetal surface of the placenta appears normal and the cord is eccentrically placed.

"This is an intraligamentous pregnancy. There is no evidence of either rupture of uterus or tube, and it seems highly probable, considering the disappearance of ovary, that the pregnancy was primarily an ovarian one and grew or ruptured through the mesovarium, to become intraligamentous in situation."

Editorial

PAPAVERINE HYDROCHLORIDE AND ACUTE ARTERIAL OCCLUSION

SUDDEN arterial occlusion, whether from embolism or thrombosis, is an event of considerable moment, calling for resourcefulness and prompt action. The results depend on several factors—the size of the occluding object, the size of the occluded vessel, the extent of the collateral circulation, and the location involved. Occlusion of the femoral artery is more serious than occlusion of the brachial, for example; occlusion of the main trunk of the pulmonary artery is usually fatal; occlusion of the central artery of the retina does not threaten life, but means loss of vision. The treatment of acute occlusion of a major peripheral artery is in the main surgical, but there are certain accessory measures which may be helpful. An article by Dr. Duncan Graham in this issue of the *Journal*, entitled "Embolism and thrombosis of the larger arteries: their diagnosis and treatment", calls attention to one of these—papaverine hydrochloride.

Papaverine hydrochloride (C_{20} H_{21} O_4 N) and its congener eupaverine (C_{19} H_{15} O_4 N) are derivatives of opium, and, generally speaking, belong to the group of antispasmodics. Visammin and narcotin are other agents of a similar sort. Their action is upon smooth muscle. The rationale of their therapeutic action is that they relieve spasm.

Attention was drawn to papaverine first by Professor Pal,[1] of Vienna, who on the basis of clinical and experimental studies suggested that it was a valuable drug to use in cases of hypertension, angina pectoris, and in the crises of uræmia, in view of its power to relax smooth muscle without paralyzing it. Pal's observations seem to have been somewhat neglected, for it is only within the past two or three years that we have had any serious study of the matter, with one exception.

D. I. Macht[2] has given us a comprehensive study of the action of papaverine. The drug causes a fall in blood pressure, due partly to its action on the brain but chiefly to peripheral action, as it causes marked dilatation especially of the peripheral and splanchnic arteries. The heart is slowed and the force of its contraction is increased. The bronchi are dilated and the respiratory rate is diminished, but the volume output and alveolar ventilation are increased. The respiratory centre is not depressed. Macht confirms Pal's statement that papaverine relaxes all types of smooth muscle without paralyzing them. As regards its analgesic properties, 40 mg. of papaverine correspond to 10 mg. of morphine.

M. Sato[3] found that papaverine causes loss of tone in the wall of the bowel and a lessening of peristalsis, but that this action lasts only for a few minutes and is followed by an increase.

Samaan's[4] studies on eupaverine are important. "In the toad, rabbit, and dog eupaverine depresses the heart by direct action on the muscle. In the rabbit the coronaries dilate. In the dog and rabbit respiration is accelerated at the beginning, while in the dog there is an early fall in blood pressure. In small doses the acceleration of the heart beat from central vagal depression caused by the early fall in blood pressure compensates for the vasodilatation,

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and the blood pressure quickly returns to normal. With large doses the low blood pressure persists. With fatal doses death is preceded by asphyxia, and respiration is arrested before the heart."

It has long been thought that the sudden obstruction of an artery causes a reflex spasm of the vessel involved and also in the collateral vascular tree. The truth of this conception was proved by Gosset, Bertrand and Patel,[5] who in their studies of embolism produced experimentally found that an embolus was fixed at the point of lodgment by arterial spasm. This spasm is probably of a reflex nature. A summary of the literature covering this point is given by Allen and MacLean.[6] The chief experimental evidence advanced in support of it is that provided by Mulvihill and Harvey.[7] These workers found that when the external iliac arteries in dogs were ligated a drop in the temperature of the hind limbs occurred, which gradually passed away. When lumbar sympathectomy was performed before the ligation the drop in temperature did not take place; if performed after the temperature had dropped the temperature immediately returned to normal. Therefore, the exclusion of the vasoconstrictor influence prevented circulatory embarrassment.

In view of its action in counteracting spasm in unstriped muscle it would seem that papaverine has a useful place in therapeutics. Theoretically, at least, it should be of value in angina pectoris, coronary thrombosis, cerebral arteriospasm, occlusion of the central artery of the retina, pulmonary embolism, embolism of the major arteries of the extremities, and in embolism or thrombosis of the superior mesenteric artery. In most of these conditions it has not been tried, so far as we are aware. A brief reference to some of the clinical observations must suffice.

Denk[8] has used papaverine in 10 cases of acute arterial occlusion due to embolism; in 6 an adequate circulation was restored. In the case of the failures two of the patients were treated late (24 to 72 hours after the onset); one other had marked peripheral arteriosclerosis, and in one no explanation could be assigned. Denk thought that the good results were due to the release of the spasm of the vessels which occurs at the time of onset and constitutes an additional menace to the affected part.

In Allen and MacLean's case (*loc. cit.*), which was one of diabetic gangrene in both legs, the obstruction in the right femoral artery was relieved in the most remarkable way after the exhibition of papaverine hydrochloride, but death occurred shortly after, there being extensive occlusion of the left common iliac as well, which apparently was not affected by the drug. Nevertheless, the authors think there is virtue in the treatment.

De Takáts[9] in his series of 5 cases of arterial occlusion had one patient with pulmonary embolism who recovered after the use of papaverine. The author, however, admits that he might have recovered in any event. Three patients had embolism in several peripheral vessels and one had acute peripheral thrombosis. Not very satisfactory cases! Nevertheless in some there was a striking improvement in the circulation sufficient to warrant further investigation.

In discussing the therapeutic application of papaverine hydrochloride in cases of vascular occlusion it should be emphasized that the drug cannot be expected to give satisfactory results unless given early, that is, not later than six to eight hours after the onset of signs and before death of tissue has taken place. In the case of accessible arteries, such as the brachial, popliteal, and femoral, surgical measures should be invoked as well (embolectomy), and, in suitable cases, the Pavaex apparatus of Hermann. The longer surgical measures are delayed, the less likely will a satisfactory result be obtained. But, papaverine has its field of usefulness in cases where surgical intervention is delayed or unavailable. In the case of obstruction of internal vessels it will be the sole prop. It will be interesting to

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see if papaverine hydrochloride has any place in the treatment of coronary thrombosis. In view of its action in lowering blood pressure the drug would have to be used with caution during the stage of collapse, if at all, but after the immediate shock has passed off papaverine hydrochloride, in small doses, might be expected to give good results.

The optimal dose of papaverine hydrochloride has probably not yet been determined. Allen and MacLean (*loc. cit.*) state that they have given the drug intravenously in doses of half a grain without harmful effect. Others have used one-quarter of a grain with benefit. Experience will decide. The drug has been given by the mouth and subcutaneously, but the intravenous method is to be preferred, as speed counts.

Papaverine hydrochloride can be kept in capsules containing half a grain, and can be dissolved in a small amount of physiological saline. The solution can be sterilized in a spoon by heat and should be injected slowly. Eupaverine appears to be less toxic than papaverine and twice as effective therapeutically, but it is soluble with difficulty and is, therefore, not so available. A.G.N.

NASTY NOISES

WE note with satisfaction that Montreal is at last taking up seriously the problem of controlling objectionable noises. This subject has been considered by other large cities for some eight or ten years now and substantial progress has been made. During this period valuable data have been collected, and we are now enabled to judge the effect of special legislation. Montreal and the other cities in Canada, are therefore, in a position to benefit greatly from the experiences of those elsewhere, both in Europe and America. Public opinion in this country seems to be aroused to the importance of controlling noise, and it should be possible to establish and put in operation sensible, fair, and effective measures which will make for health and happiness.

Samuel Johnson once defined music as "the most bearable of all noises". One wonders what the great pundit would have called the hideous cacophony that would assail his ears were he living today in any large city. Imagination fails. It may be admitted that a certain amount of noise is inevitable and inescapable in connection with the multitudinous phases of modern business, but few will deny that much of it is unnecessary, annoying, and harmful. Most of us could draw up a fair list of objectionable noises. The following, classified as to causes, is sufficiently comprehensive:—

Traffic: Trucks, buses, motorcycles, horns, brakes, cut-outs, gears, defective brakes and mufflers, exhausts, whistles, rattling parts and loads, sirens, bells.

Homes: Radios, pianos, phonographs, musical instruments, late parties, dogs, cats, defective piping.

Transportation: Street cars, delivery wagons, locomotives, brakes, steam and oil exhausts, whistles, bells.

Construction: Pneumatic drills and riveters, steam and gasoline hoists, steam shovels, pile drivers, blasting, shouting, compressors, demolition of buildings.

Industry: Factories, foundries and mills.

River: Whistles, bells, shouting, steam winches, engines, fog-horns, trucks.

Other Street Noises: Blaring radio and music stores, shouting peddlars, garages and taxi stands.

Most of us, too, would agree as to the relative order of offensiveness of the various sounds. The motor vehicle, including the motor bicycle, comes easily first as a noise maker; next, the radio. The motor vehicle we have with us always and at all times—night and day. Most of the honking is unnecessary and many cities now prohibit the use of horns between specified hours at night. Prof. H. E. Reilly, of McGill University, who is making a study of the noise problem in Montreal states that at a certain street intersection 97 per cent of the horn signals were totally unnecessary, that is to say, that 97 per cent of the drivers were careless or thoughtless. We all know that when a traffic jam occurs some one in the long line of cars gets impatient and starts honking, quite oblivious of the fact that some reason for delay exists which neither he nor those

in front can overcome. Such action merely reveals the offender's own irritability, and can only have the effect of exciting the nervousness and arousing the anger of others in the line. The man who stops his car in front of an apartment house and starts honking to bring some one to the door because he is too lazy to get out and ring the door bell deserves the pillory. Curbing indiscriminate honking is the first step towards sanity. Then, the radio. This instrument, properly used, is a joy, but, as some people use it, becomes an infernal machine. We all know of the housewife who starts the radio before breakfast and keeps it going till late at night. This facilitates her work apparently, though it is hardly possible that she can pay any special attention to what comes over. But this action raises murderous thoughts in the hearts of the neighbours! We could name a literary man of eminence who publicly stated that he could work better when a noise was going on around him. If he was serious this is a sad commentary on the state of some people's nerves. It is to be hoped that his plight is the exception rather than the rule, though, in fact, we seem to be rapidly approaching the time when we shall regard noise as normal and quietness as abnormal. Professor Reilley is quoted as saying that "The energy of the sound emanating from some types of automobile horns is approximately 10,000,000,000 times that required to make the ear register a sound; the steamship whistle and the motor truck, 1,000,000,000 times; the street-car, 100,000,000 times; the noisy passenger automobile, 100,000,000 times". He asks, pertinently,—"Is it to be wondered at that we are fast becoming nervous wrecks?"

It is hard to appraise in exact words the damage to health that excessive noise brings about. Up to a certain point we have a protective mechanism. Noise of moderate degree, if it becomes habitual, fails to register fully on our ear. Like the housewife referred to, we are conscious that there is a noise, but of its nature and significance we are largely unmindful. But, the old adage, "Continuous dropping will wear away a stone", applies here. The effects of noise are at first slight and perhaps not appreciated by the sufferer, but eventually they become noticeable, and are, probably, cumulative. But, admitting all this, we are, most of us, of the opinion that excessive noise is injurious.

Recently, the state of health as related to noise of some three hundred employees of a certain firm was investigated. After noise-reducing devices had been introduced into the building where they worked the visits of the girls to the medical department were reduced from about twenty-five or thirty a day to six. It was also found that under conditions of quietness the efficiency of the workers was increased 9 per cent. In certain countries "occupational deafness" is recognized as an actual condition and is compensable, but this matter has not as yet received the attention that it deserves. It has long been known that the discharge of a cannon may cause deafness and even rupture of the drum membrane in those standing close by, and it is altogether probable that lesser noises may damage the fine structures of the inner ear and auditory nerve and cause a degree of deafness. It is said that shop-workers, boiler makers, riveters, mechanics, taxi-drivers, and policemen are becoming deaf.

But there is another way in which, beyond any question, noise is detrimental, and that is by its interference with sleep. All human beings require a certain period of rest and oblivion to maintain health. Excessive noise during the sleeping hours is apt to interfere with rest, and it should not be forgotten that not a few workers are on night duty and have to sleep in the daytime, when noise is most rampant. Noise, too, is particularly harmful to the invalid, the convalescent, and to infants. All these traumatic insults make for nervous irritability and bad temper.

Apart from this, there is an economic side to the matter. People are apt to move away from districts that are unbearably noisy into the suburbs, leaving houses untenanted. School buildings become vacant and have to be replaced by new in other parts. Noisy towns are not popular for residential purposes.

Much can be done, and has been done, to remedy this undesirable state of affairs. Public opinion is waking up, health boards are interested, and industrial concerns are giving cooperation, mainly as a result of patient work on the part of voluntary bodies of citizens who are interested in the welfare

of their communities. After some six or eight years the Anti-noise League of London has become an authority on noise abatement and its advice is sought by governmental and local authorities and by industrial concerns when this matter is being dealt with. Only recently, an exhibition was held in London of noise-controlling appliances of many kinds, exhibited by the manufacturers of automobiles and various other forms of machinery, which attracted much attention, being visited by about 40,000 people. Even the horrific street drill has been made almost attractive—at a price! Legislation in the premises has proved difficult, and enforcement of the law even more so. Whatever laws are passed should be just, reasonable, and capable of application. Perhaps the greatest difficulty lies in regard to definition. An example is found in the local Acts in force in London, which provide that "a noise nuisance exists if any person makes or continues, or causes to be made or continued, any excessive or unreasonable or unnecessary noise which is injurious or dangerous to health: but if the noise occurs in the course of any trade, business, or occupation it is to be a good defense that the best practicable means of preventing or mitigating it, having regard to the cost, have been adopted." This seems fair, in that it looks to the rights both of the noise sufferers and the noise makers, yet it certainly presents several loopholes for dispute.

We thank Professor Reilley and his associates for their excellent work and will look with interest for the result of their effort.

A.G.N.

Editorial Comments

The Canadian Journal of Medicine and Surgery

We note, with regret, the cessation of the *Canadian Journal of Medicine & Surgery*. It was established in Toronto in 1897, under the editorship of Dr. J. J. Cassidy, who was succeeded by Dr. W. A. Young in 1914. Dr. Young was editor until his death in 1933.

There was always an air of independence about this journal, and its disappearance is a distinct loss to the Canadian journalistic world. It is not easy to establish a medical journal in these days, and whilst some may question whether more journals are needed rather than less, there is something to be said for one that represents the enterprise and energy of individuals as continuously as did this one.

This journal was also a link with the older Canadian medical journals, as it incorporated some orginating as early as 1868. Its genealogical tree embraced the *Canada Lancet & Practitioner*, the *Canadian Health*, and the *Hospital World*.

H.E.M.

A Warning Notice

The following letters speak for themselves.

"If you will publish a notice in the *Canadian Medical Association Journal* warning your physicians not to pay any money for our publications to a William Henry Patterson, we will appreciate it very much.

"About a year ago he applied to us for a position as solicitor and collector. Appearing to have considerable experience and a high moral character, we arranged with him to work for us. At that time we had no reason to believe he would perpetrate any dishonest acts. Due to the fact that Patterson began retaining money in excess of the amount earned, we wrote him on July 20, 1936, to discontinue acting as our agent. However, he failed to do so. We have received a number of complaints from physicians in Regina, Moose Jaw, Calgary, Winnipeg, and Edmonton, who paid Patterson for our publications. He neither reported the collections nor sent the money to us.

"On his employment application, Patterson stated he was 48 years of age—5 ft. 8½ in. tall, weighed 180 lbs., had brown hair turning grey, and hazel eyes." Very truly yours,

AMERICAN MEDICAL ASSOCIATION,
Nov. 18, 1936. (Sgd.) A. W. STACK.

"Please publish a warning regarding the activities of a Mr. William H. Patterson who is soliciting orders for our publication, *Surgery, Gynecology and Obstetrics*, and other medical journals published here in the States. He accepts money in payment for orders, having cheques to cover the subscriptions made payable to himself instead of to the publishers. Mr. Patterson retains money so received and does not report orders taken.

"Medical publishers here in the States have had numerous complaints from members of the Canadian medical profession regarding his fraudulent activities. Anything you may do to warn the members of the profession in Canada of this man's activities will be greatly appreciated." Very truly yours,

SURGERY, GYNECOLOGY AND OBSTETRICS,
(Sgd.) R. U. MYERS,
Nov. 21, 1936. Circulation Manager.

Men and Books

MEDICINE AND POETRY

BEING AN ACCOUNT OF THOSE SONS OF ÆSCULAPIUS WHO HAVE ON OCCASION PAID HOMAGE TO THE ELDER GOD, APOLLO.

"A physician should be a kind of poet."

BY E. P. SCARLETT, M.B.

Calgary

PART II.

The eighteenth century is notable in literary history for the number of poets whose work was acclaimed in their own day but who to later times seem dull to the point of dreariness. George Crabbe (1754-1832) is of this group. Byron called him "Nature's sternest painter, yet the best". Even Jane Austen said that she "could fancy being Mrs. Crabbe". But he sounded no strain to stir posterity. He was apprenticed to a village surgeon near his native place, Aldborough, in Suffolk, and later spent a year in London hospitals, during which time he was haled before the magistrate because his landlady mistook the baby which he was dissecting for her own child who had just died. He failed to make a success of practice and later took orders. As a clergyman he was a friend of the poor and could combine medical advice with his work as a cleric. Crabbe was a realiest who wrote grimly of life as he saw it, and particularly stressed the sordid existence of the poor. He is an important figure in literary history, representing the reaction against the frigid conventional writing of the time and the artificial manner of verses to Phyllis and Corydon and my lady's eyebrows.

It is of the very essence of the irony of history that a man whom the arrogant Akenside and the other imperious medical men of the day frequently passed in the Fleet Street or the Strand with a pitying glance, or more probably splashed with mud from their carriages — a man, shabbily dressed, short of stature, with an ugly, pale face pitted with small-pox, long, protruding upper lip, and forehead broad and projecting—that this man should have gathered about himself a host of legends and become one of the best-loved figures in our literature. Such is the way of genius; and Oliver Goldsmith (1728-1774) is of this select company.

It is unnecessary if not quite impossible, to sketch in a few words the sprightly mixture we call Goldsmith, the open-hearted, improvident Irishman, "the ugly duckling" of the Johnsonian circle of immortals. We may be permitted, however, to examine the reason for the M.B. which appeared after his name on an early title page. After graduating B.A. at Trinity College, Dublin and spending several advances of money from his family in an attempt to get out of Ireland, he turned up in Edinburgh where he studied medicine for a short time. He then wandered over Europe, playing on the flute and debating at the universities for a livelihood; returned to England, where he was a druggist's assistant and set up as a physician for a time at Southwark. Coming to London, he went up for examination at the College of Surgeons in a suit of clothes which he had borrowed and which he afterwards pawned, but he was marked "not qualifyd". He was similary rejected by the naval boards to whom he applied as a surgeon. In a cloud of misery and at times starvation he was in succession, school usher, proof reader, journalist and apothecary. His attempts at practice were as happy-go-lucky and as prodigal as his nature. The patients and the attending apothecary quarrelled with his advice and his dosages which were apparently given under the impulse of the extravagant inspiration of genius. Finally his resolution to drop practice was fervently seconded by his friend Topham Beauclerc, who advised him, if he were resolved to kill, to concentrate on his enemies.

It would appear from a contemporary newspaper that in February, 1769, Oxford University gave him an *ad eundem* degree of Bachelor of Medicine, and it is supposed by students of his life that Goldsmith after his travels on the Continent obtained the Dublin M.B. *in absentia,* thus making this later English degree possible. This would account for his medical title which he most certainly acquired, for Goldsmith was too honest a man to claim a fictitious degree. Let it be recorded, too, as pointed out by Crane, that Auenbrugger's treatise on percussion of the chest, published in 1761, was made known in England by a review of the work which Goldsmith wrote in the same year.

In any event, such a wayward genius could contrive nothing but misfortune from the practice of medicine, which demands some limits to the exuberance of its members. And medicine, in one of the queer turns of fortune which marked all of Goldsmith's life, did exact a final toll from him. In his last illness Goldsmith, in spite of the protest of his medical attendant, William Hawes, insisted on dosing himself with large amounts of the famous James's powder, then having a great vogue. This was an antimonial preparation, and it is probable that his death was accelerated by antimony poisoning. There was certainly a stir in the press over the

matter at the time. This last outrage of genius on nature was thus revenged; Goldsmith paid his "cock to Æsculapius". But what medicine denied him, "the draggle-tailed Muses", as he called literature, paid him in full measure. As one of our few universal men of letters he produced a great book, *The Vicar of Wakefield,* a great play, *She Stoops to Conquer,* and poetry which is the best of its kind. The memorable couplets of *The Deserted Village* have in many instances become part of our daily speech. It is often forgotten how frequently Goldsmith is on our tongue.

"When lovely woman stoops to folly."
"A youth of labour with an age of ease."
"A man he was to all the country dear,
And passing rich with forty pounds a year."
"And fools who came to scoff remained to pray."
"And still they gazed, and still the wonder grew
That one small head could carry all he knew."
"Ill fares the land, to hastening ills a prey,
Where wealth accumulates and men decay."
"Silence gives consent."
"For he who fights and runs away
May live to fight another day."
"To husband out life's taper at the close,
And keep the flame from wasting by repose."

When Goldsmith died the staircase of his lodging in the Temple was crowded with the weeping figures of London's derelicts and its poor whom he had helped, however blundering his medical aid. "Goldie" he was to his friends. His monument in Westminster Abbey with the famous Latin inscription written by Dr. Johnson, says in part, "There was no kind of writing that he did not touch, none that he touched that he did not adorn."

While still in the company of genius it should not be forgotten that the brilliant and versatile German poet Schiller (1759-1805) qualified as a doctor of medicine at the age of twenty-one, and practised for a time as an assistant surgeon in a grenadier regiment at a salary of eighteen florins ($7.50) a month. He speedily found his true vocation in literature, and left army surgery to rougher spirits.

There are other names in this century—hardly even minor poets—who may be mentioned. James Grainger (1721-1766) depended chiefly on his pen rather than on his practice for a living. While in the West Indies he wrote a poem in four books called *The Sugar Cane,* which dealt in doubtful lyric fashion with the cultivation of that plant. It is chiefly notable for the remarkable line— "Say, shall I sing of rats?" Dr. Johnson when reading this line thundered out a vehement "No", to the laughter of his audience. Edward Jenner (1749-1823), the discoverer of vaccination, wrote occasional poems, the best of which is the *Address to a Robin.* Andrew Crawfurd (1786-1854), of Lochwinnoch, was a famous man of letters in his day. It is pleasant to think of John Mason Good (1764-1827), translating Lucretius as he walked the London streets on his medical calls, and of John Leyden (1775-1811), in his early twenties already a master of many languages, assisting his friend Sir Walter Scott with the earlier editions of the *Minstrelsy of the Scottish Border.* More versatile was von Haller (1708-1777) who wrote the first great modern treatise on physiology. During the seventeen years in which he was professor of medicine at Göttingen he contributed to a monthly journal which he conducted some 12,000 articles on almost every branch of knowledge. Osler puts him in the first rank of our medical poets.

It is possible to go on through a long list of eighteenth century physicians who were poetasters, rough lampoonists, lively blades whose wit crackled while their rhyming couplets served the custom of the day. Through it all is expressed the intimate relation between literature and medicine which Osler and Allbutt revived in our own day. In a fanciful way Sir Edmund Gosse has suggested that this relation might be perpetuated by having a statue of the great and gentle Dr. John Arbuthnot, the author of *The History of John Bull,* with busts of Pope, Steele, Swift and Gay at the corners of the pedestal.

The roll of nineteenth century medical poets opens with the name of the most illustrious figure in the group which we are considering—John Keats (1795-1821). In some respects it is a Philistine presumption, almost an impertinence, for medicine to assert any claim to Keats. He is one of the immortals of our race and belongs to the world. And yet medicine in all humility may state that it cradled him. As a modern writer has put it, "Medicine suffered a loss, but the world gained when this prodigal son strayed off into a far country".

Keats's major works are so much a part of our common heritage that they require no comment in this paper. It is of more immediate interest to examine the way in which the poetic genius burst through the bounds which the study of medicine had placed about the young man. Keats, a spirited pugnacious lad, and a natural leader among his fellows, was left an orphan at the age of fourteen. In the following year he was apprenticed by his guardian to Mr. Hammond, a surgeon of Edmonton, in whose service he spent more than four years. The young apprentice already had a passion for literature, and during these early years completed a translation of the *Æneid.* But it was the reading of Spenser's "Færie Queen", through which he ranged with delight, that awakened his genius, and his earliest compositions are in imitation of Spenser. The earliest sign that Keats had seriously committed himself to poetry occurred in February, 1815, when he impulsively handed his friend, Clarke, a sonnet entitled *Written on the day that Mr. Leigh Hunt left Prison.* He was in his nineteenth year at the time and still an apprentice. While

none of these earlier efforts were precocious, in midsummer of this same year there was a sudden blaze of genius. Keats and Clarke had read a borrowed folio copy of Chapman's Homer far into the small hours of the morning. Keats, who left for home in a state of excitement, composed and sent back a sonnet which Clarke found on his breakfast table when he came down in the morning. It bore the title *On First Looking into Chapman's Homer*, and is one of the perfect things in our literature.

"Much have I travell'd in the realms of gold,
And many goodly states and kingdoms seen;
Round many Western islands have I been
Which bards in fealty to Apollo hold.
Oft of one wide expanse had I been told
That deep-brow'd Homer ruled as his demesne:
Yet did I never breathe its pure serene
Till I heard Chapman speak out loud and bold:
Then felt I like some watcher of the skies
When a new planet swims into his ken;
Or like stout Cortez when with eagle eyes
He stared at the Pacific—and all his men
Look'd at each other with a wild surmise—
Silent, upon a peak in Darien."

In those lines the young apprentice for the first time "speaks out loud and bold", in accents which were to widen the boundaries of those very realms "which bards in fealty to Apollo hold". Poetry was already the interest of his heart.

However, he passed with credit his examination as licentiate at Apothecaries' Hall and registered at Guy's Hospital on October 1, 1815, to continue his studies. He was a diligent student, sufficiently outstanding to attract the attention of the celebrated Sir Astley Cooper, from whom he received his principal lectures. During the first winter and spring in London he lived the typical drudging life of the medical student, rooming with two fellow students in dingy lodgings in the Borough near Guy's Hospital. While here he wrote the two sonnets:

"O Solitude! if I must with thee dwell,
Let it not be among the jumbled heap of murky dwellings."

(the sentiment of many an obscure young student), and—

"To one who has been long in city pent,
'Tis very sweet to look into the fair
And open face of heaven . . . ."

In the course of his first year as a student at Guy's, Keats moved to lodgings over a tallow-chandler's shop in St. Thomas's Street. Here one evening while his fellow-student Stephens was studying, Keats broke out with the announcement that he had composed a new line of poetry:

"A thing of beauty is a constant joy."

To Keats's inquiry Stephens replied that he liked the line, but it seemed wanting in some way. After an interval of silence came Keats's rejoinder:

"A thing of beauty is a joy forever."

And so there was born in the little room of a trio of medical students "one of the imperishable lines of English poetry".

Keats continued to do his work regularly and with considerable credit. But the poet was always elbowing aside the medical student. As he himself says, "The other day, during the lecture, there came a sunbeam into the room, and with it a whole troop of creatures floating in the ray, and I was off with them to Oberon and fairy-land". He worked as a dresser, but always seemed curiously apart from the work. He later told a friend—"My last operation was the opening of a man's temporal artery. I did it with the utmost nicety, but, reflecting on what passed through my mind at the time, my dexterity seemed a miracle, and I never took up the lancet again." He qualified with credit in July, 1816, but after a holiday at Margate returned to London resolved to write poetry, and with the ambition to be among the great. Medicine was already forgotten, and with an intensity which few poets, even the greatest, have shown, Keats gave himself up to his work as a writer.

In the following three years—three wonder-years into which he packed the sensations and achievements of a lifetime—he refers to medical practice on several occasions. In May, 1818, he writes—

"Were I to study physic or rather medicine again, I feel it would not make the least difference in my Poetry; when the mind is in its infancy a Bias is in reality a Bias, but when we have acquired more strength, a Bias becomes no Bias. Every department of knowledge we see excellent and calculated towards a great whole. I am so convinced of this that I am glad at not having given away my medical books, which I shall again look over to keep alive the little I knew thitherwards . . . ."

And again in the course of his most famous letter, written to his brother in March, 1819:—

"I have been at different times turning it in my head whether I should go to Edinburgh and study for a physician; I am afraid I should not take kindly to it; I am sure I could never take fees—and yet I should like to do so: it's not worse than writing poems and hanging them up to be fly-blown on the Review shambles."

Medical practice was never distasteful to him; he never showed for it the dislike with which so many geniuses have regarded the more work-a-day vocations. To him it was like sojourning in a far country. So (if we may correct the expression of a writer previously quoted), Keats, rather than being the prodigal son of medicine, was born to Poetry and as a lad with a sort of uneasy wonder strayed into the country of medicine, but as he became conscious of his powers returned to his own land where he received the goodly inheritance

of immortality. His chief in medicine, Sir Astley Cooper, is still remembered by physicians; Keats is known to the world.

It is the destined privilege of the physician, like the Happy Warrior, "to go in company with pain and fear and bloodshed", and to be constantly on some terms of understanding with man's ancient enemy, Death. It is not strange, therefore, that a physician should have become obsessed with the idea of Death and in his solitary quest sought even to "uncypress" Death (as he puts it) and to make him "the fool o' the feast". This "Death's jester" was Thomas Lovell Beddoes (1803-1849), whose figure is one of the curiosities of literature and biography. A man of great poetic genius whom many hailed as the successor to Keats, his life was a thwarted, sorry affair, but his achievement is that, along with Edgar Poe, he is one of the masters of the macabre in literature. He was the son of a celebrated English physician, and after leaving Oxford, went to the Continent, where he received his medical degree from the University of Würzburg. An orderly life was constantly shattered by his becoming involved in political intrigue. He finally committed suicide at the age of forty-six. His last letter is painfully revealing:—

"My dear Phillips, I am food for what I am good for—worms. I have made a will here which I desire to be respected . . . . Thanks for all kindnesses . . . . You are a good and noble man and your children must look sharp to be like you. Yours if my own, ever, T. L. B."

And the bitter joking postscript:—

"I ought to have been among other things a good poet; Life was too great a bore on one peg and that a bad one."

Beddoes bequeathed all his manuscripts to his friend, T. F. Kelsall, who in turn on his death directed that they be given to Robert Browning. The papers were contained in a large box which Browning finally allowed Sir Edmund Gosse and Mr. Dykes Campbell to explore. Gosse in 1890 published an edition of Beddoes's collected works, while apparently Campbell contented himself with transcribing all the original manuscripts. The box and its contents subsequently disappeared, but the last chapter in the story was written this year when H. W. Donner, who has had access to the Campbell copies, published the entire works of Beddoes, giving his book the title *The Browning Box*.

Beddoes's works are cast mostly in the form of the poetic drama. He is an Elizabethan dramatist of the company of Marlowe and Green, born out of season. His chief work is the play *Death's Jest Book*, upon which he laboured at intervals for more than twenty years. It is the greatest dramatic variant in English on the old Dance of Death theme which has haunted painters and writers for centuries. The scenes are crowded with murder, ghosts, skulls, all cast with a strange beauty that is peculiar to Beddoes. His is the concentrated grim irony and harsh mirthless laughter of one who is preoccupied with death. The dark background of the play is lit up with an unearthly beauty by many haunting lyrics and dirges.

"The swallow leaves her nest,
The soul my weary breast;
But therefore let the rain
On my grave
Fall pure; for why complain?
Since both will come again
O'er the wave."

and:—

"If thou wilt ease thine heart
Of love and all its smart,
Then sleep, dear, sleep;
And not a sorrow
Hang any tear on your eyelashes;
Lie still and deep,
Sad soul, until the sea-wave washes
The rim o' the sun tomorrow,
In eastern sky."

And again:—

"We do lie beneath the grass
In the moonlight, in the shade
Of the yew-tree. They that pass
Hear us not. We are afraid
They would envy our delight,
In our graves by glow-worm night . . . ."

His lyric *Dream Pedlary* which is in every anthology has haunted generations of readers.

"If there were dreams to sell,
What would you buy?"

Beddoes failed to snare his enemy Death, but posterity has attempted to make some amends by awarding him at least a small measure of fame.

In contrast to the dark spirit of the exiled Beddoes is the figure of Oliver Wendell Holmes (1809-1894), the cheery, whimsical man of the world, scholar, essayist, novelist, poet and physician. In his achievements in literature he has often been called "the American Goldsmith". He is unique, however, in combining the career of a distinguished medical man with the avocation of letters, with such success that he is known to young and old as a writer, while few realize that he was a physician, and are quite unaware of his contributions to medical science and to the wider life of his profession. Holmes began general practice in Boston with the motto that the smallest fever would be thankfully received. He later became Professor of Anatomy at Harvard University, and occupied this chair for thirty-five years. It is probably as the author of the *Autocrat of the Breakfast Table* that he will be remembered. However, his output of verse amounts to three volumes, and some poems rise above the level of well-turned craftsmanship. *Old Ironsides* stirred the country in his own day. Every school boy knows *The One Hoss Shay*. *The Last Leaf* is perfect of its kind.

"I saw him once before,
As he passed by the door;
And again
The pavement stones resound,
As he totters o'er the ground
With his cane."

With its concluding stanza:—

"And if I should live to be
The last leaf upon the tree
In the spring,
Let them smile, as I do now,
At the old forsaken bough
Where I cling."

The Chambered Nautilus is his greatest poem, composed, as he says, at the only time that he wrote under the urge of inspiration. Its last stanza is known to all.

"Build thee more stately mansions, O my soul,
As the swift seasons roll!
Leave thy low-vaulted past!
Let each new temple, nobler than the last,
Shut thee from heaven with a dome more vast,
Till thou at length are free,
Leaving thine outgrown shell by life's unresting sea."

Holmes's spirit and his wit are still a leaven among us.

Other names of this period which may be noticed are Edward Osler (1798-1863), the uncle of Sir William Osler, who wrote hymns and poetry; Thomas Trotter (1760-1832), a naval surgeon and author of one of the earlier treatises on scurvy; Paul Broca (1824-1880), the neurologist, who wrote poetry under the anagram name Bap Lacour; Richard von Volkmann (1830-1889), whose name is associated with ischæmic contracture, and who published verse under the name of Richard Leander; and Thomas Gordon Hake (1809-1895) who retired from medicine to write poetry and who was a member of the Rosetti circle. Robert Southey (1774-1843) the poet-laureate listed as a medical student for a time, but failed to pursue the course.

Although only one of the "casuals" of medicine, the name of Francis Thompson (1859-1907) must be included in any review of this kind. Among those whom we are pleased to call medical poets Thompson stands next to Keats in sheer poetic genius and in the power to evoke the wonder of great poetry. Born in Manchester, the son of a physician, Thompson, in deference to his father's wishes, studied medicine at Owens College for six years. Failing repeatedly to pass the degree examination, he went to London to seek his fortune. There followed five years of the most terrible privation and struggle against ill-health of which the annals of genius in our race have record. Reduced to beggary and the selling of pencils in the street, sleeping in cabmen's shelters, living in the strange hell compounded of hashish and opium. Thompson sounded the very depths of human degradation. But not of human despair, for he retained a curious child-spirit and a calm, attended by the mighty spirits of his poetic imagination. As he says of Shelley, he "fled into the tower of his own soul, and raised the drawbridge". Finally he was rescued by his friends, Mr. and Mrs. Wilfrid Meynell, and through their kindness continued to enjoy the care and security which he had been unable to find for himself in the world. This act of the Meynells is without parallel in literary history in its rewards, for it enriched the world with some of its greatest poetry. Mr. Wilfred Whitten (John o' London) has described his friend Thompson during these years:

"A stranger figure than Thompson's was not to be seen in London. Gentle in looks, half wild in externals, his face worn by pain and the fierce reactions of laudanum, his hair and straggling beard neglected, he had yet a distinction and an aloofness of bearing that marked him in the crowd; and when he opened his lips he spoke as a gentleman and a scholar . . . . His great brown cape, which he would wear on the hottest days, his disastrous hat and his dozen neglects and make-shifts were only the insignia of our *Francis*."

He fought long against tuberculosis, and finally succumbed in a London hospital in 1907 at the age of forty-seven.

Thompson's poetical work is comprised in three slender volumes. He is a mystic, in the tradition of Vaughan, but his mysticism is illuminated by a golden radiance of phrase and imagery that at times yields lines unequalled in our language. His masterpiece *The Hound of Heaven* celebrates the age-old idea of the Divine Love that forever pursues men. It is one of the most tremendous poems ever written, and its power and imagery have been approached only by Shelley and the author of the Book of Revelation. The first stanza sets the glorious tempo of the poem.

"I fled Him, down the nights and down the days;
I fled Him, down the arches of the years;
I fled Him, down the labyrinthine ways
Of my own mind; and in the mist of tears
I hid from Him, and under running laughter.
Up vistaed hopes I sped;
And shot, precipitated,
Adown Titanic glooms of chasmed fears,
From those strong Feet that followed, followed after.
But with unhurrying chase,
And unperturbed pace,
Deliberate speed, majestic instancy,
They beat—and a Voice beat
More instant than the Feet—
All things betray thee, who betrayest Me."

One or two quotations from other poems must suffice.

"Nothing begins and nothing ends,
That is not paid with moan;
For we are born in other's pain
And perish in our own."

(Daisy)

"Not where the wheeling systems darken,
And our benumbed conceiving soars!—
The drift of pinions, would we hearken,
Beats at our own clay-shuttered doors.

The angels keep their ancient places;—
Turn but a stone, and start a wing!
'Tis ye, 'tis your estranged faces,
That miss the many-splendoured thing."

(In No Strange Land)

And Thompson's prose is a precious legacy in itself. Those who would discover the infinite riches of the English language will find them displayed in the essay on "Shelley". Thompson describes the imagery of Shelley's poetry in these words:—

"The universe is his box of toys. He dabbles his fingers in the day-fall. He is gold-dusty with tumbling amidst the stars. He makes bright mischief with the moon. The meteors nuzzle their noses in his hand. He teases into growling the kennelled thunder, and laughs at the shaking of its fiery chain. He dances in and out of the gates of heaven: its floor is littered with his broken fancies. He runs wild over the fields of ether. He chases the rolling world. He gets between the feet of the horses of the sun. He stands in the lap of patient Nature and twines her loosened tresses after a hundred wilful fashions to see how she will look nicest in his song."

Yes, one must include Thompson in our list if only for the pleasure of experiencing something of the glories and magic of language.

On an entirely different plane, and more in the nature of occasional verse, are the poems of S. Weir Mitchell (1829-1914), the distinguished neurologist, whose name is a household word in medicine. Mitchell took Holmes's advice to stick to his medical practice until he was over forty, and had an established reputation before publishing any literary work. He wrote much successful fiction, based mainly on his experiences with nervous disorders.

In the field of lesser verse William Henry Drummond (1854-1907) is a master in his poetry of the French-Canadian habitant. He was born in Ireland, and in early life came to Canada with his parents. He combined medical practice in Quebec with literary work and lecturing, publishing four volumes of poetry. As the poet of a people, he possesses an original genius, and it seems certain that much of his work will live, in spite of its dialect difficulties.

One physician at least has been admitted to that select group of literary immortals whose fame rests on a single poem. On December 8, 1915, there appeared anonymously in *Punch* a little poem *In Flanders Fields,* which uttered the universal mood of the time, and whose lines quickly echoed round the world. The author, John McCrae (1872-1918) is now one of that vast company of gallant gentlemen who sleep in Flanders Fields. He was born at Guelph, Ontario, achieved distinction in pathology, served in the South African war, and in October, 1914, went overseas as a medical officer with the first Canadian contingent. In January, 1918, while acting as a Consulting Physician to the British Armies in the Field, he died of pneumonia. The volume of his collected poems was published in 1919, and included the beautiful memoir written by Sir Andrew Macphail, itself a notable addition to Canadian literature. All the poems are etched in greys and browns and are touched with a pensive melancholy. The metre of *In Flanders Fields* is one which McCrae had used previously. An earlier poem in the same medium and no less beautiful than the one by which he is known is *The Night Cometh.*

"Cometh the night. The wind falls low.
The trees swing softly to and fro;
Around the church the headstones grey
Cluster, like children strayed away
But found again, and folded so.

No chiding look doth she bestow:
If she is glad, they cannot know;
If ill or well they spend their day,
Cometh the night.

Singing or sad, intent they go;
They do not see the shadows grow;
'There yet is time', they lightly say,
'Before our work aside we lay';
Their task is but half-done, and lo!
Cometh the night."

It is surely the gracious act of the divine justice of literary fame that has claimed this reticent Canadian physician for its own.

There is still another garland in the shrine of medical poetry. Robert Bridges (1844-1930) is the only medical man in the long line of the poet-laureates of England. Bridges was educated at Eton and Oxford and received his medical degree from Oxford in 1874. He continued his studies at St. Bartholomew's Hospital where he became casualty physician. Later he was assistant physician at the Children's Hospital, Great Ormond Street, and physician to the Great Northern Hospital. He gained a considerable reputation in his profession, and was made a Fellow of the Royal College of Physicians. After eight years of practice he retired to devote all his time to writing. His work includes poetic dramas, poetry and critical essays. His first published work, a volume of lyrics was in 1873 when he was still a student of medicine. He was appointed Poet Laureate in 1913, and in 1929 received the Order of Merit. A lifetime of devotion to literature was crowned by the publication on his eighty-fifth birthday of his great philosophical poem, *The Testament of Beauty.* He must be ranked among the most learned of English poets, writing with distinction on art, music, medicine, science, history, philosophy and literature. He was as well a classical scholar and an accomplished linguist. He died at his home at Boar's Hill, overlooking Oxford, in 1930.

In Bridges's poetry the classical and the Elizabethan traditions are most happily joined. But he is too subtle and restrained a poet ever

to have a wide appeal. It is of interest, however, that since his death his fame has been slowly broadening. A master of metre, he has made music of surpassing beauty in both old and new measures. At least one of his lyrics, *Awake, my Heart, to be Loved* is one of the matchless things of its kind. For the most part his work is the result of a cultured, disciplined mind expressing the sense of beauty in experience; as Robert Lynd says, he is the poet of nine o'clock in the morning. It is worth recalling the sonnet which he wrote when he deserted medicine for poetry:—

"I will be what God made me, nor protest
Against the bent of genius in my time,
That science of my friends robs all the best,
While I love beauty and was born to rhyme.
Be they our mighty men, and let me dwell
In shadow among the mighty shades of old,
With love's forsaken palace for my cell;
Whence I look forth and all the world behold,
And say, These better days in best things worse,
This bastardy of time's magnificence,
Will mend in fashion and throw off the curse,
To crown new love with higher excellence,
Curs'd tho I be to live my life alone,
My toil is for man's joy, his joy my own."

Bridges, the metrist, is seen in this delightful triolet:—

"All women born are so perverse
No man need boast their love possessing.
If nought seem better, nothing's worse:
All women born are so perverse.
From Adam's wife, that proved a curse
Though God had made her for a blessing.
All women born are so perverse
No man need boast their love possessing."

Our own generation has added a host of medical poets, some distinguished, others less well known. This is a fact worth noting in an age reputed to be poor in poets. Sir Arthur Conan Doyle (*Songs of Action*, 1898); Sir Ronald Ross (1857-1932), famous for his work on malaria; Havelock Ellis; Sir Donald MacAlister, whose *Echoes* (1913) was an amazing *tour de force* in poetical translation; Oliver St. John Gogarty, the laryngologist (*Offering of Swans*, 1923); Dan McKenzie, with his poems in Scots vernacular; Sir Rickman Godlee; Henry Head (*Destroyers*); Sir Charles Sherrington (*Assaying of Brabantius and Other Verse*, 1925); Francis Brett Young, who is also famous as a novelist.

In these years of the flood-tide of science, when we are apt to measure accomplishments by their immediate practical value, it is well to remind ourselves that a great line of poetry is probably the greatest of human achievements. Certainly it is the surest way to avoid the iniquity of the poppy of oblivion. For men must always return to poetry, if only to express or to realize their nobler moments. It is the invisible portion of man's literary inheritance in which current shows find no entrance.

It is only natural that the one group of men —the physicians—who know "upon what tender filaments" the fabric of life hangs, and whose pursuits lead them to listen to

"The still, sad music of humanity,"

should have chosen to record something of their experience in the only fitting and durable medium—poetry. And it is pleasant thus to think of medicine's contributions to the wealth of Parnassus. Lodge, with his singing beauty; Campion, now lying in Fleet Street Church in the heart of London; Vaughan's mystic wonder; the stern realism of Crabbe; the humanity of Goldsmith; Keats faring for all time in "the realms of gold"; Beddoes splendidly, if forlornly, mocking Death; the witty Holmes, holding untouched by wordly fame and college drudgery the beauty which is the heart of poetry; Thompson, whose verse is like "a fire of lights before an altar"; McCrae who was always going to the wars, and who found there his trysting-place with destiny; Bridges quietly pursuing his quest of beauty through a world grown weary with war and change. Of poetry here is God's plenty, and worthy of record. It is part of the great tradition of medicine.

Association Notes

THE ANNUAL MEETING

After an interval of thirteen years the Ottawa Medico-Chirurgical Society is again to play the part of host to the Canadian Medical Association and the Ontario Medical Association at anniversary sessions to be held conjointly at Ottawa during the week of June 21, 1937; these sessions representing, respectively, the 68th and the 57th annual meetings of the two Associations.

The Canadian Medical Association

President, H. M. ROBERTSON, Victoria.
President-elect, T. H. LEGGETT, Ottawa.
General Secretary, T. C. ROUTLEY, Toronto.

The Ontario Medical Association

President, C. K. COLBECK, Welland.
President-elect, R. K. PATERSON, Ottawa.

Ottawa Medico-Chirurgical Society

President, H. B. MOFFATT, Ottawa.
President-elect, R. L. GARDNER, Ottawa.
Secretary, T. L. FISHER, Ottawa.

Present signs indicate that the meeting in which these three medical bodies are so vitally interested is to be a conspicuous success. In cooperation with the Executive of the Canadian Medical Association, and under the personal supervision of Dr. T. C. Routley, no fewer than twenty-five committees of the local Society at

Ottawa are already engaged in organization work.

The Chateau Laurier has been secured as the place of meeting, and contracts have been entered into whereby its splendid facilities as a convention hotel are to be placed at the disposal of the medical profession throughout the whole week of the combined sessions.

From month to month in the columns of the *Journal* specific mention will be made of details as they devolve from plans now under way to provide a scientific program of exceptional merit, to say nothing of various matters pertaining to social entertainment.

At the moment it is of the utmost importance that members of the profession throughout Canada should plan for their Ottawa visit next June without delay. Although accommodation will be found for the very large numbers attending the convention, those who speak first are likely to secure the best places available. Apart altogether from special attractions in the way of professional foregatherings, it must be remembered that, more and more, Canadians are learning to regard Ottawa not as merely a rival city but as the centre of national life and ambition and dignity—a place which may be locally the home of a certain number of citizens of Ottawa, but which, nationally, is the home of every Canadian.

In arranging for accommodation it is urged that the hotel of choice be communicated with directly. Any difficulty experienced in this connection can be set right by a card addressed to the Chairman of the local Committee on Housing, Dr. J. H. Alford, 235 O'Connor Street, Ottawa. Particulars of hotel accommodation will be given later.

In its capacity of host to the members of the Canadian and of the Ontario Medical Associations, the Ottawa Medico-Chirurgical Society is eager to extend its hospitality to the wives and families of their professional confrères from every part of the Dominion. A visit to Ottawa —one of the most beautiful national capitals in the world—can be made an education in itself. Particularly is this so in the case of those of "teen" age, those for whom an intimate contact today with the treasures of historic interest which the Capital alone possesses, will mean much in the fostering of national ideals.

For the benefit of all who look forward to a holiday in Ottawa next summer, from other than a purely medical point of view, forthcoming numbers of the *Journal* will contain items of outstanding interest.

At the last meeting of the Executive Committee proposals were approved looking to the institution of a composite fee for the national and provincial associations in the provinces of Nova Scotia, New Brunswick and Ontario. It was felt that, if Nova Scotia could secure 250 members of the profession to pay $15.00, the problem would be solved there most adequately. It is with much pleasure that we now report having received information from Nova Scotia that 267 doctors out of slightly over 400 in the province have signified their willingness to pay the combined fee.

An intensive drive has been commenced in Ontario, an urgent appeal having gone out to all the profession over the signature of the President, Dr. W. K. Colbeck; and, in addition, over 3,400 copies of the December *Journal* are being mailed to non-members of the Ontario Medical Association in the province with the compliments of the Ontario Medical Association. A membership drive is being undertaken in every area of the province. Excellent results are confidently anticipated.

Plans for the Ottawa meeting are developing most satisfactorily. Acceptances of invitations to present papers have been received from a large number of those invited. With respect to local arrangements, the Ottawa Committee is thoroughly organized and is functioning most acceptably.

Hospital Service Department Notes

Food Service in the Small Hospital

There are, or were, 216 graduate dietitians employed in Canadian hospitals, as reported in the 1935 Directory of Hospitals in Canada. Realizing that quite a few hospitals have several dietitians, yet allowing for some increase in the interval, it is presumed that even today not more than approximately two hundred hospitals employ dietitians. What then of the food service in the remainder of the 936 hospitals operating in Canada?

This is a real problem in our smaller hospitals. All too often the planning of meals is left almost entirely to the cook, who is usually one who can cook well enough and does the best she can, but who has little or no knowledge of the dietary needs and tastes of the sick. Often the meals are better adapted, both in quality and in service, to the boys' camp than to the sickroom. What skilled assistance is given usually comes from the nursing superintendent, or one of her assistants, who may endeavour to keep a general eye on the dietary service, but who is usually too busy with her multitudinous other duties to give it real serious thought. Attention, however, is focussed upon this need

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All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, 184 College Street, Toronto.

when it becomes necessary to make dietary arrangements for diabetic or other patients for whom diet is the chief factor in treatment. So much emphasis is now being placed upon dietetics that in some larger hospitals from one-third to one-half of the patients are upon special diets. Undoubtedly more special diets would be prescribed in smaller hospitals were it possible to obtain, or finance, the skilled assistance needed.

Several excellent suggestions were made at the recent convention of the Saskatchewan Hospital Association. Miss O. J. Argue, dietitian to the Saskatoon City Hospital, offered a solution to the difficulty of financing a dietitian by proposing that the smaller hospitals employ a "dietitian-housekeeper", the two responsibilities being combined in the one person. The dietitian in such institutions might also undertake the supervision of the laundry. A second suggestion was that the dietitian, because of her training in chemistry, and other laboratory work, might, with some instruction, undertake the limited work of the pathological technician in the smaller hospital. She might, on the other hand, take charge of the clinical records. Miss Argue's third suggestion was that smaller hospitals might combine to support a "travelling dietitian". Such a woman could spend a month or two at a time in each of the participating hospitals, act in an advisory capacity to them all between visits, and the cost to each hospital would be comparatively small. Still smaller hospitals might consider the employment of a dietitian-cook. It was suggested also that student dietitians might be sent to the smaller hospitals to gain practical experience during their course, the experience of being on their own and of handling uncooperative kitchen personnel being most valuable. This field work would correspond to that in courses in public health and in social service.

Where the dietary service is not satisfactory, conferences on the subject between the medical staff and the administrator and trustees are indicated. Not only is properly supervised dietetics of tremendous value in the treatment of an increasing number of diseases, but there is evidence that proper consideration of vitamins, minerals, etc. is of real benefit in raising the resistance of the nurses and others to disease, and in minimizing the incidence of such common complaints among nurses as nail trouble and flat feet.

UNIVERSITY OF ROCHESTER.—The Rockefeller Foundation has made a grant of $10,000 for the investigation of filterable viruses under the direction of Dr. George P. Berry, professor of bacteriology and associate professor of medicine, and one of $6,400 for the study of the biological effects of heat by Dr. Stafford L. Warren, associate professor of medicine and radiology.

Medical Societies

The Canadian Physiological Society

The second annual meeting of the Canadian Physiological Society was held at Queen's University, Kingston, on October 31st. There was an attendance of 150. There were two scientific and business sessions, and a dinner in the evening. Principal R. C. Wallace was the guest at the dinner and addressed the Society briefly.

Ten new members were elected to the Society, making a total membership of 209. A constitution was adopted, and a Council for 1936-37 elected, consisting of the following:

President, Prof. J. B. Collip, F.R.S., McGill University; *Secretary*, Prof. G. H. Ettinger, Queen's University; *Treasurer*, Prof. E. M. Watson, University of Western Ontario; *Councillors*, Prof. B. P. Babkin, McGill University, Sir Frederick Banting, F.R.S., University of Toronto, Prof. Antonio Barbeau, Université de Montréal, Prof. Romeo Blanchet, Université Laval, Québec, Prof. G. F. Marrian, University of Toronto, Prof. V. H. K. Moorhouse, University of Manitoba.

The Society was invited to hold its next meeting in London, Ont., where it will likely meet in May, 1937.

Twenty-one communications were read, many of which provoked vigorous discussion. Abstracts of some of these papers are given below.

THE VITAMIN C CONTENT OF ONTARIO APPLES AND POTATOES—H. Branion and (by invitation) E. J. Reedman, J. H. Carter and C. L. Cook, Ontario Agricultural College, Guelph.

The ascorbic acid of 24 varieties of Ontario apples was chemically determined. Four of 6 varieties assayed showed the presence of reversibly oxidized ascorbic acid. A wide variation in the antiscorbutic potency of varieties was found. No correlation between chromosome number and vitamin C content was evidenced, but there were some suggestions of a genetic relationship.

The vitamin C content of 10 varieties of potatoes was similarly determined. Ascorbic acid was present in three forms—free, reversibly-oxidized, and bound. Although the total ascorbic acid content was fairly constant, the relative amounts of the three forms varied widely between varieties, suggesting some difference in the stabilizing mechanism.

FURTHER OBSERVATIONS ON THE EFFECTS OF ANTERIOR PITUITARY EXTRACTS ON LIVER FAT—James Campbell and C. H. Best, Department of Physiological Hygiene, University of Toronto.

We have previously reported that the administration of a fraction prepared from beef anterior pituitary glands to fasting rats produces a rapid increase in the size and an intense fatty infiltration of the liver. There is a marked variation in the response of various species of animals to the extract. The sensitivity of guinea pigs, mice, rats and chickens follows the order in which they are mentioned. Associated with the changes in liver fat an increased ketogenesis is found in rats and guinea pigs. The body fat of guinea pigs fed a balanced ration is decreased by the anterior pituitary extract.

A convenient method, using mice as test animals, for assay of the principle in anterior pituitary extracts which increases the deposition of fat in the liver is described.

THE LATENCY OF THE PREMATURE BEAT IN THE LOWER VERTEBRATE HEART—John Fiddes, Department of Physiology, University of Saskatchewan.

The object of this work has been to verify or otherwise former findings obtained during research undertaken at Aberdeen University in 1929. At that time I concluded that the accepted time-duration of latency of the premature beats, as found in physiology texts, was very far out.

The generally accepted idea is founded on the pioneer work of Marey and may be summarized as follows. After the absolute refractory period is over sufficiently strong stimuli may elicit a response as a premature contraction. This premature beat is of small size and has a very long latent period. During the so-called relative refractory period the premature beats become progressively larger and the latencies shorter, the later in diastole and stimulus is applied, until at full relaxation the latency is as short as that of the primary beat.

It was pointed out by Woodworth[1] and later by myself that the latencies shown in Marey's classical diagram[2] were much longer than they should be. I found that if proper precautions were taken to prevent spread of current to tissue outside the ventricle the latencies of premature beats, early or late, were practically of the same time duration as that of the primary beat.

In my previous work[3] I pointed out that the long latencies were the sum-total of (1) the latency of supraventricular tissue, excited and responding at a time when the ventricle was still absolutely refractory; (2) the time taken for the impulse to pass to the ventricle *via* the junctional tissue, and (3) the true latency of the ventricular premature beat itself when the ventricle was again responsive.

The work done here confirmed my former findings, so that my conclusions are that, with the kymographic method, the latency is about 0.05 seconds for all beats primary or premature. Of course this time is very much longer than the actual latent period of cardiac muscle, but relative values will remain constant.

I think it is time that Marey's diagram was qualified with remarks on the excessive and erroneous latencies depicted.

REFERENCES

1. WOODWORTH: *Am. J. Physiol.*, 1903, **8**: 223.
2. See HORNELL: Text Book of Physiology, 10th ed., 1927, p. 578, fig. 237 (or corresponding part of latest edition).
3. FIDDES: *Quart. J. Exper. Physiol.*, 1929, **19**: 262 and 265.

USE OF THE DIETARY ANŒSTROUS RAT AS A TEST OBJECT FOR THE ŒSTRUS-INDUCING GONADOTROPIC HORMONE OF PREGNANCY URINE—R. D. H. Heard and S. S. Weinstein, Connaught Laboratories and Department of Biochemistry, University of Toronto.

Adult female rats on a diet deficient in vitamin B are rendered anœstrous; administration of anterior-pituitary-like hormone subcutaneously induces vaginal cornification. The "characteristic" dose-response curves have been constructed. Conveniences and limitations of the method when compared with other systems of assay are discussed.

THE EFFECT OF CONTINUOUS STIMULATION OF VAGUS NERVE IN THE DOG—G. E. Hall, G. W. Manning (by invitation) and F. G. Banting, Department of Medical Research, University of Toronto.

Long-continued daily administration of acetylcholine has been shown to produce fatal cardiac damage. (Such experiments have been reported to this Society). Prolonged daily stimulation of the vagus nerve in the completely anæsthetized animal failed to duplicate these results. When, however, vagus stimulation was carried out under very light nembutal anæsthesia, cardiac damage was evidenced. Such damage was less marked or absent in atropinized and more marked in eserinized animals. These results were confirmed by similar experiments without anæsthesia.

THE SITE AND MODE OF ACTION OF CHOLINE DERIVATIVES, ATROPINE AND PILOCARPINE—V. E. Henderson and M. H. Roepke, Department of Pharmacology, University of Toronto.

Prior to the work of Hunt, of Loewi and of Dale and their co-workers the action of choline, muscarine, pilocarpine and atropine was generally considered to be upon nerve-endings, though this had been severely shaken by Anderson. The work of the authors referred to seems to indicate that acetylcholine and atropine act upon the cell. This is supported by the work of Clarke, who showed that only a part of the cell surface could be attacked. Physico-chemical studies limit the probable mode of action of choline derivatives with the cell to either the side chain or a cationic exchange. Studies by the authors with the choline and its esterase serve to confirm this suggestion, and also to indicate that the complex formed by union with the cell influences the physiological reaction of the cell.

THE EFFECT OF IONIZED CALCIUM ON THE TIME-CONSTANT OF ACCOMMODATION IN NERVE—A. V. Hill (by invitation) and D. Y. Solandt, Department of Physiology, University College, London, and the University of Toronto.

The time-constant of accommodation (λ) has been measured on the nerves of certain crustacea, frogs, fish and man (Solandt, *Proc. Roy. Soc. B.*, 1936, **119**). Increasing the calcium in the nerves' environment hastened accommodation (lowered λ) and *vice versa*. To correlate the quantity of ionized calcium present in the environment with the absolute value of λ frog nerves were exposed to Ringer's solution containing known percentages of the citrate ion (Hastings *et al.*, *J. Biol. Chem.*, 1934, **107**). Accommodation became infinitely slow, as shown by spontaneous activity of the nerve, with a citrate ion concentration of 0.07 per cent. This quantity of citrate permits only 16 per cent of the calcium present to exist in the ionized form.

AN INTERRELATION BETWEEN VITAMIN B_1, CHOLINE AND FAT IN INFLUENCING WEIGHT CHANGES IN YOUNG RATS—E. W. McHenry, School of Hygiene, University of Toronto.

Evans and Lepkovsky showed that fat had a sparing action for vitamin B_1. This work has been repeated with and without dietary choline. With a diet deficient in vitamin B_1 the inclusion of more than 26 per cent fat prevents a serious loss in weight. The effect of the fat is improved by the addition of choline. Under such conditions the optimal amount of dietary fat has been found to be about 40 per cent. When vitamin B_1 is supplied and choline is deficient the amount of dietary fat optimal for weight increase ranges between 10 and 26 per cent.

THE MAIN AND ANASTOMOTIC ADRENAL VEINS—David P. Seecof, Jewish General Hospital, Montreal.

In all animals there are venous channels arising within the medulla or from the main adrenal veins which anastomose with veins of other organs. These anastomotic veins permit fluctuations in quality, quantity and direction of blood flow within and outside the gland which have been overlooked or ignored in studies on

the output of substances from the adrenal glands. In the human and in only a few other mammals the structure and innervation of the main and anastomotic veins varies with age. These variations may have an important bearing on clinical disturbances and on surgical procedures.

THE ENDOCRINE BACKGROUND OF THE TOXÆMIAS OF LATE PREGNANCY, WITH SUGGESTIONS FOR THERAPY—E. V. Shute, Department of Obstetrics and Gynæcology, University of Western Ontario, London.

A new approach to the problem of the toxæmias is indicated. The endocrinologist can distinguish two main types, *viz.*, those tending to end in *abruptio placentæ* and those tending toward eclampsia. A series of 96 cases of the first group and 9 of the second group is discussed. Laboratory and clinical differential points are described. The amazing results of wheat germ oil therapy in the first group is discussed in detail. Two case reports of the second group are given *in extenso* to indicate the results of œstrin therapy.

THE MEASUREMENT OF A PREGNANDIOL COMPLEX IN HUMAN URINE—Eleanor M. Venning, J. S. Henry (by invitation), and J. S. L. Browne, from the McGill University Clinic, Royal Victoria Hospital, Montreal.

A method for the quantitative determination of sodium pregnandiol-glucuronidate in human urine is described. Measurements of the excretion of this substance have been made during the normal menstrual cycle and throughout pregnancy. In one normal case followed throughout the menstrual cycle no pregnandiol complex was detected in the urine up to the time of ovulation (as determined by the occurrence of intermenstrual bleeding). Within twenty-four hours of ovulation this substance appeared in the urine and was excreted continuously over a period of ten days. Two and a half days following its disappearance menstruation began.

After injections of progesterone, sodium pregnandiol glucuronidate is excreted in the urine. During pregnancy the output in the early months has not yet been definitely determined, but there is a definite increase in the rate of excretion of this substance, which begins usually late in the second or early in the third month. The output continues to rise from then until the eighth or ninth month. Within twenty-four hours of delivery the compound has disappeared practically completely from the urine. Patients who have a tendency to abort have a lower output than in the cases of normal pregnancy studied. The relationship of this substance to the metabolism of corpus luteum hormone is discussed. The authors regarded it as the excretion product of corpus luteum hormone.

Other papers read and omitted here for lack of space are given below. A complete reprint can be obtained from Dr. G. H. Ettinger, Queen's University, Kingston, Ont.

THE OXYGEN CAPACITY OF THE BLOOD OF FRESHWATER FISH—E. C. Black and L. Irving.

SULPHITES AS PROTEIN PRECIPITANTS: A SIMPLE METHOD FOR DETERMINING A.G. RATIOS—W. R. Campbell and M. I. Hanna.

THE DETERMINATION OF NITROGEN BY MODIFIED KJELDAHL METHODS—W. R. Campbell and M. I. Hanna

THE ADRENAL CORTICAL EXTRACT REQUIREMENT OF THE CAT—R. A. Cleghorn, E. W. McHenry and G. A. McVicar.

SECRETION OF $CaCO_3$ FROM THE SHELL BY CLOSED VENUS MERCENARIA—Ls. P. Dugal and L. Irving.

CONTRIBUTION A L'ETUDE DE L'EAU FIXÉE CHEZ LES PLANTES MARINES IN VIVO—G. Gosselin and P. Bouthillier.

THE EFFECT OF INFLATION OF THE LUNGS UPON RESPIRATION IN BEAVER—L. Irving.

ŒSTRIOL GLUCURONIDE—G. F. Marrian, S. L. Cohen and A. D. Odell.

CHEMICAL CHANGES IN THE YOLK DURING THE EARLY DEVELOPMENT OF THE CHICK—G. Schmidt.

A LONG KYMOGRAPH—R. W. Waud.

The Canadian Rheumatic Disease Association

At a meeting of the Council of this Association, held at Montreal on May 9, 1936, it was recommended that for the present the Association use, with slight modifications, the nomenclature and classification referred to in the report of the Special Arthritis Committee of the British Medical Association, which was published in the *British Medical Journal,* June 17, 1933.

The following is the nomenclature and classification proposed for use by our Association:

1. Acute and Subacute Rheumatic Fever;

2. Specific Joint Infections, such as those dependent upon gonococcal, pyogenic, enteric, and dysenteric organisms, and those associated with the exanthemata;

3. Joint Affections of Metabolic and Hæmopoietic Diseases—for example, gout, hæmophilia, purpura, and of organic nervous diseases—Charcot's joints.

4. Rheumatoid Arthritis — Chronic polyarthritis (Continental nomenclature); Atrophic (Goldthwait); Proliferative (Nichols and Richardson), (American nomenclature).

5. Chronic Villous Arthritis.

6. Osteo-arthritis—Hypertrophic (Goldthwait); Degenerative (Nichols and Richardson).

7. Spondylitis—Ankylopoietica; Osteo-arthritica.

8. Fibrositis—Intramuscular and fascial; Periarticular; Bursal and teno-synovial; Subcutaneous (panniculitis); Perineuritic.

The following is a précis of the recommendations of the National Scheme for Great Britain, which, with certain modifications and adjustments, would probably be applicable to Canada. It is a summary of the Report of the Special Committee of the British Medical Association, *British Medical Journal,* June 17, 1933.

SUGGESTED NATIONAL SCHEME FOR GREAT BRITAIN

For this certain conditions must be satisfied, namely:

1. Early recognition.
2. Thorough treatment in the early stage of the disease.
3. Adequate follow-up of cases in order to observe the effects of treatment; arrangement for further courses of treatment when necessary; and re-admission, if required, to treatment centres in case of relapse.

In addition the scheme

1. Must not interfere with the proper relation between patient and family doctor more than is necessary to ensure the best interests of the patient.

2. Must utilize existing facilities for diagnosis and treatment either in private consulting rooms or in public institutions.

Some type of general organization is necessary to secure and apply these conditions. Recognition must be the province of the family doctor. Extra facilities will have to be given to provide post-graduate instruction in this field. In the earlier stages treatment can be carried out very largely by out-patient methods at or in the neighbourhood of the patient's home, but a certain proportion will require in-patient treatment or treatment away from their homes for longer or shorter intervals.

After the case has been investigated, and, when possible and desirable, etiological factors have been dealt with either in the patient's home or by means of facilities afforded in hospitals, nursing homes, etc., the treatment will include some or all of the following:

I. General regimen: rest, fresh air, diet.
II. Specific treatment (vaccines, etc.).
III. Drugs (including organotherapy).
IV. Physical treatment: heat, massage, electricity, remedial exercises, hydrotherapy.
V. Spa treatment.
VI. Orthopædic, manipulative, and other surgical treatment.
VII. Occupational therapy.

INDICATIONS FOR FUTURE RESEARCH

Incidence.—It is desirable to determine the distribution of the arthritic conditions dealt with in this report (*a*) in the country as a whole; (*b*) in various trades and occupations; and (*c*) in various localities and under different climatic conditions.

Bacteriology.—According to some authorities the pathological conditions which exist in arthritis are due to direct invasion of the joint tissues by microorganisms. Opposed to this view is the claim that such changes are due to the sensitization of the tissues by toxins derived from bacterial foci in some other part of the body. It would be desirable to determine the relative importance of these two agencies. It has been claimed by some and denied by others that it is possible to reproduce in animals arthritic lesions identical with those present in the arthritis of man. Confirmation on this point is necessary.

The nature and strain of the microorganisms responsible, directly or indirectly, for arthritic changes, and the extent to which they may be isolated from the tissues and body fluids await determination. To settle these questions the closest cooperation between clinicians and bacteriologists is necessary. The most up-to-date equipment in the laboratory, and the provision of special research beds in hospitals, are prerequisites to success, and many experiments will have to be repeated and subjected to the most rigid controls. Much of this work can probably be done only in specially equipped hospitals and by specially skilled observers who are able to continue their investigations over a considerable period of time.

Biochemistry. — The general nature of the sedimentation rate test still awaits elucidation, and the recognized discrepancy between an improved condition of the patient, on the one hand, and the delayed return to a normal blood sedimentation rate, on the other, requires investigation.

The following investigations would appear to be important in relation to arthritis and allied conditions: (1) calcium metabolism; (2) liver function; (3) the presence of (*a*) hæmolysins, (*b*) glutathione in the blood; and (4) skin reactions and allergic manifestations.

Clinical features.—Cooperation between clinicians, radiologists, morbid anatomists, and comparative pathologists is necessary to determine a correspondence between their several findings, so that an agreed classification of arthritic diseases may be obtained.

Treatment. — Controlled experiments are needed to determine the value of the numerous therapeutic methods advised for the treatment of the various forms of arthritis.

Royal College of Physicians and Surgeons of Canada

REPORT OF THE ANNUAL MEETING, OCTOBER, 1936

(Continued)

The Committee on Specialists presented their report on a very important subject, *viz.*, the qualification, examination and registering of specialists. With the advent of statutory bodies setting up schedules of fees for medical services rendered (Workmen's Compensation Boards, Health Insurance Commissions, etc.) and for the protection of the public and the information of the profession at large it is becoming more and more evident that an authoritative register of qualified specialists in Canada should be established. It is the expressed opinion of the Canadian Medical Association Executive Committee that this Royal College is the proper body to undertake this task. Amendment to the Charter will be required. In the meantime a Committee of this College is actively collaborating with a similar Committee of the

Canadian Medical Association in a study which is expected to result in definite action within the year.

The Honorary Treasurer submitted the audited Annual Report which shows a small operating surplus for the year. But the report of the Finance Committee demonstrated that the activities and expenses of the College are increasing; that the revenues from capital investments are diminishing as securities mature and demand reinvestment at lower rates of interest; that the secretarial duties are altogether too heavy to be handled by an Honorary Officer with part time clerical assistance; and that Members of Council should be reimbursed, at least in part, for expenses incurred in attending meetings of Council. It was decided to amend the by-laws, and under the authority conferred by Act of Incorporation to impose upon all Fellows annual dues of $10.00 for the fiscal year ending September 30, 1937, and for a total period of five years at which time the by-law would again come forward for reconsideration.

Convocation ceremonies concluded the afternoon session. Honorary Fellowship in both Divisions of the College was conferred upon His Excellency, The Lord Tweedsmuir, Governor-General of Canada. His Excellency was presented to the President by Dr. Duncan Graham, Immediate Past-president, and made acknowledgment in a few fitting words.

Honorary Fellowship in the Division of Medicine was conferred upon Henry Asbury Christian, Professor of Physic of Harvard University. He was presented by Dr. A. H. Gordon, Vice-president of the Division of Medicine.

The Annual Dinner of the College was held in the Quebec Suite of the Chateau Laurier. The guest of honour was His Excellency Lord Tweedsmuir. Other guests included Prof. Henry Christian, Prof. L. C. Huskins, Dr. P. H. Thorlakson, General A. G. L. McNaughton, President of the National Research Council, Dr. H. M. Robertson, President of the Canadian Medical Association, Dr. T. H. Leggett, President-elect of the Canadian Medical Association, Dr. R. K. Patterson, President-elect of the Ontario Medical Association, and Dr. H. B. Moffatt, President of the Ottawa Medico-Chirurgical Society. His Excellency was the only speaker, and the text of his address follows:—

"I am very sensible of the honour you have done me in making me an Honorary Fellow of your Royal College of Physicians and Surgeons. Ignorant as I am of the sacred art of healing, I have had much to do with your profession, for, as Member for eight years for the Scottish Universities, I represented a considerable part of the medical faculty of Britain. So, if I know little about your craft, I know a good deal about its practitioners. And during this summer in Montreal I have had a pleasant experience of the skill and wisdom of some of your doctors, for which I shall always be most grateful.

"I have already had occasion to pay tribute—the tribute of the outside spectator—to the high quality of your profession in Canada, and to the prestige which it enjoys on the American Continent. Here in Canada you are in a wonderful position, for you hold, it seems to me, the strategic vantage ground in medical studies on this Continent. You draw from England and Scotland—that I suppose is your main influence. You also draw from France, and you have the great avenue which joins you to the United States. You can never be isolated; you will always be stimulated by fresh currents of thought from many quarters. I can never forget that the greatest doctor I have ever known was a Canadian, Sir William Osler.

"And the memory of Osler leads me to remark how interesting it is for a student of literature, such as myself, to see how a great doctor can add to the technique of his profession a strong interest in humane learning. Osler was one of the most widely cultivated men I have ever known, a true scholar in other departments than medicine. The other day there died in England an old friend of mine, Lord Moynihan, who was of the same type, and who was, incidentally, one of the greatest masters of the spoken word I have ever known. I have just been reading Dr. Harvey Cushing's 'Note Book of a Surgeon in the Great War'. I cannot imagine a more powerful argument for the abolition of war than his study of it from the point of view of a brain surgeon. What I want to say about that book is that it is so admirably written that it would be a credit to any man whose sole profession was letters. As the work of a busy surgeon it is an extraordinary performance in its mastery of sound English prose. But I am bound to say also that I have just read Dr. Cushing's Foundation Lecture, published in the Foundation Volume of the Montreal Neurological Institute, and I confess I made very little of it. I did not understand the language, and spent my time puzzling out, from my knowledge of Greek, the innumerable compounds beginning with *psycho* and *neuro*. My respect for Dr. Cushing became greater than ever, for it is not everyone who can write both what is brilliantly lucid and brilliantly obscure!

"One might compare the duties of a doctor with those of a soldier, but it would be a very special kind of soldier. The ordinary battalion officer has a plain task before him, for he is under orders and has not himself to trouble about the higher questions of strategy and tactics. He has his day-to-day task, and that suffices. But the doctor is not only faced with a multitude of urgent duties but he has to keep abreast of a rapidly developing science, for he owes it to his patients to bring to bear upon their cases the latest scientific developments. It is as if a Battalion Commander in action had, in addition to his normal duties, the business of understanding in detail the policy of his Commander-in-Chief. Your profession, therefore, will always have its dual function. It has the duty of research and experiment in the quest for truth, the enlargement of its sphere of knowledge, and it has also the duty of applying its existing body of knowledge to the daily task of alleviating pain and misery. It has the functions of a General Staff, and also the functions of what I might call the Q side of an army. I have lately been on an extensive tour in the Prairie Provinces and have visited many of the outland districts. There I have been enormously struck with the work of your profession in all its branches. I have found doctors with huge areas to cover, leading a life as hard as that of any pioneer. I have found little stricken townships

where small hospitals contrive to function gallantly with slender staffs and narrow means. I have met men who at college had taken high honours and who began their Prairie practice with hopes of being able to continue some branch of research, and visions before them of further training in London or Berlin or Vienna. These visions are now things of the past, and they have settled down to the hard day-to-day task of relieving suffering, putting behind them their professional ambitions in the interests of common humanity. They had no reward—no material reward—for their labours, only the consciousness of a difficult duty faithfully performed. I have never met men whom I have more sincerely respected. Your profession in Canada has won international repute for its contributions to medical science. But do not let us forget the other side—the hundreds of men who are labouring faithfully and obscurely in the remoter districts, maintaining the highest traditions of one of the noblest and most unselfish of human vocations.

"We are all inclined sometimes to speculate about the future. One often hears it said that we have got on terms with the chief diseases which afflicted our forefathers; but that the advance of civilization will always bring new ailments. We may have mastered the old epidemics, like small-pox, the plague, and typhoid; but the strain of modern life has brought a multitude of new afflictions, both of the body and the mind. Now I think we are wrong if we imagine that our ancestors had only straight-forward physical ailments, and suffered little from subtler things. If you will read the memoirs of two centuries ago you will find constant references to complaints which were clearly neurotic—the 'green sickness', for example, from which young women suffered in the eighteenth century, the 'melancholic' habit from which stalwart figures like Oliver Cromwell were not exempt. If I may speak as an historian, it seems to me that very few of the great figures of history were what might be called healthy and normal people. Most of them did their work under grave physical handicaps for which there was then no medical relief. You had Julius Cæsar with his mysterious epilepsy; you had Robert Bruce with a painful skin disease; you had Cromwell with some kind of spleen trouble; you had Walter Scott with gall stones—I think I could find a pathological side to almost every famous historical figure. These men did their work to a very constant accompaniment of pain.

"My friend, Colonel Lawrence of Arabia, used to maintain to me that bodily pain was a real mental stimulant, and that half his inspiration in Arabia came from the fact that he was wrestling all the time with pain and weakness. I do not know what scientific basis there may be for that view, but I think we may take it as true that in the past some of the chief work of the world, both in action and thought, has been accomplished to the accompaniment of pain. To-day much of that pain would be relieved. Of that I think there can be no question. We have no doubt acquired certain intricate and mysterious medical problems of our own, but the more obvious things we can relieve by operation or treatment. Now I cannot but feel that in this there is a clear gain. Pain may be a stimulant to the mind, but it is also a source of confusion and bewilderment. It blurs the perspective, obscures the sense of proportion, and disturbs the balance. If we can get rid of it we prepare the way for a more level judgment and a saner perspective. I feel that that is one great gain on which we can pride ourselves. Our public problems to-day are intricate as perhaps they have never been before, and what above all is needed is a steady balance and a stalwart commonsense. We need far less the inspirations of genius than patience, equanimity, and sound judgment in the ordinary man. If the advance of medical science can provide this, as I believe it can, then it is contributing something of incalculable value to the peace and comfort of the world."

University Notes

University of Manitoba

I. Maclaren Thompson, B.Sc., M.B., Ch.B., (Edin.), Professor of Anatomy and Chairman of the Division of Anatomy, University of California Medical School, has accepted a position as Professor of Anatomy in the Faculty of Medicine, University of Manitoba, and will assume his new duties at the beginning of the year. Professor Thompson is a native of Newfoundland, was educated in Edinburgh, and taught anatomy in McGill University before proceeding to California.

A post-graduate course on Clinical Endocrinology is being given at the Manitoba Medical College from November 18th, 1936, to March 10th, 1937. The course is limited to thirty and is intended to embrace the application of endocrinology to medicine in general.

McGill University

The Quinquennial Reunion of the University took place from October 21st to 24th, and was highly successful from all points of view. Some 700 graduates registered. On the evening of the first day a Smoker was held. Among the interesting features was a moving picture exhibit staged by the Federal department controlling the National Parks. The subjects portrayed were, catching a sword-fish with rod and line, scenes in the life of a beaver, and skiing in the Rockies—all most strikingly filmed. Principal Morgan made a short speech of welcome and alluded to the fact that the new gymnasium would soon be an accomplished fact, and that the sod would, in a few more days, be turned for the erection of Douglas Hall, the first unit in the dormitories for men, so long hoped for. (A few days after the reunion the first sod was turned.)

On the next day a special convocation was held at which five distinguished graduates of the University were granted the LL.D. degree, *honoris causa*. The medical recipients were Dr. Maude E. Abbott and Dr. William McClure.

Dr. Abbott has recently retired from the post of Assistant Professor of Experimental Medicine after many years of useful service to the University. She graduated B.A. in 1890 and took her medical course at Bishop's University in 1894, the medical school of which was merged with that of McGill some years later. Dr. Abbott was granted the honorary degree of M.D., C.M. by McGill, the first and only time that this has been done. She carried out post-graduate studies at Zurich, Vienna, and Edinburgh, taking the L.R.C.P. and S. Dr. Abbott has written much, being the author, among other works, of "The History of Medicine in the Province of Quebec", "Historical Sketch of the Medical Faculty of McGill", "Classified Bibliography of Sir William Osler's Canadian

Period", and "Florence Nightingale". She has also attained international recognition as the leading authority on congenital heart disease, and has recently published a splendid Atlas on this subject. Within the last few weeks Dr. Abbott has been elected an Honorary Fellow of the New York Academy of Medicine. She was already a Fellow of the Royal College of Physicians of Canada.

Dr. William McClure graduated in Arts in 1879 and in Medicine in 1884. He was for a time Superintendent of the Montreal General Hospital, but left this post in 1888 to go to China under the auspices of the Presbyterian Board of Missions. He has been Professor of Medicine in the Cheloo University, Tsinan, China, and has made a notable contribution to the cause of medicine in that country.

Other events were the Intercollegiate Track Meet, a Reunion Dance, a Toronto *vs.* McGill Football Match, and a great Reunion Dinner of the last night. At this Dinner, the speakers were Mr. John Hackett, K.C., President of the Graduates Society of McGill University, in the chair; His Excellency, Lord Tweedsmuir; the Chancellor, Sir Edward Beatty, Principal Morgan, and Dr. Frank S. Patch, who all dealt with topics concerning the progress and welfare of the University.

During the Reunion the Montreal Medico-Chirurgical Society staged its Fourth Annual Clinical Convention, a gathering that has always been exceedingly popular. Lectures, clinics, and exhibits were held at the Royal Victoria Hospital, the Montreal General Hospital, the Children's Memorial Hospital, the Royal Victoria Montreal Maternity, and the Neurological Institute, contributed to by well known members of the teaching staff. Visiting physicians not graduates of McGill attended the Smoker, Convocation, and Dance and Supper as guests of the Society.

Various industrial enterprizes were good enough to act as hosts to the graduates and demonstrated the working of their plants to their visitors. Their kindness was much appreciated.

W. Gerrie, B.A., D.D.S., M.D., C.M., D.O., has been appointed Lecturer in Oral Surgery in the Faculty of Dentistry, and A. B. Brown, B.Sc., M.Sc., Demonstrator in Botany.

Dr. Gerrie came to McGill as a graduate in dentistry of Alberta University and entered the medical faculty from which he obtained his M.D., C.M. in 1931. He was then an intern for two years at the Montreal General Hospital, following which he travelled for a year in United States and in Europe.

Dr. Maude E. Abbott, who has lately retired from the teaching staff of McGill University, is at present on a lecture tour in California. She has been lecturing on the heart and giving clinics at various hospitals on "Congenital lesions of the heart", and has also given two lectures on "Osler". She has addressed the San Francisco County Medical Society and was on the program of the Annual Post-graduate Symposium of the San Francisco Heart Committee. She has had also other lecturing and teaching engagements which must have kept her busy.

Special Correspondence

The Edinburgh Letter

(From our own correspondent)

An important step in the extension of the National Health Insurance Service is at present under consideration by the Government. This is the inclusion of the 14 to 16 age group within the scope of the scheme. At the present time there is no statutory provision for these young persons. They are no longer under the care of the School Medical Service and are not eligible for medical benefit under the Insurance Act. It is accordingly highly desirable that this gap in their supervision should be filled. Before a final decision to frame the necessary legislation can be taken by the Government one of the matters to be settled is the nature of the arrangements to be made with the doctors, and this matter has been discussed in the Insurance Acts Committee of the British Medical Association. It has been suggested in certain quarters that the profession should be content to accept a lower capitation fee in respect of this age group than that which is paid for the rest of the insured population. The argument used is that the work involved in attending to them would be definitely less than that for insured persons as a whole. No statistics are available to settle this point definitely. The Insurance Acts Committee however, which is representative of all the insurance practitioners in the country, believes that the volume of work involved would not differ appreciably from that in respect of say the 16 to 18 age group. Apart however from that aspect of the situation, the Committee believes that as a matter of principle no differentiation should be made in the capitation fee payable for the various age groups in the insured population. Further, in view of the wider conception of the duty of the general practitioner in relation to preventive work which now prevails there is no justification for any such differentiation in the remuneration of the profession with regard to their responsibilities towards these young persons. As however no certificates for sickness benefit will be required for the age group in question the Insurance Acts Committee has expressed its willingness to consider a small percentage reduction from the standard capitation fee in respect of this. At the same time the Committee points out that

though in fact the actual writing of certificates will not be required of the doctor he will nevertheless in the majority of cases have to satisfy himself as to whether or not the person who consults him is or is not capable of work.

A significant development in the provision of an organized medical service for members of the public having incomes of £250 to £550 a year has taken place recently in London. This is being afforded through the London Public Medical Service, the Secretary of this organization being Dr. Alfred Cox, formerly Medical Secretary of the British Medical Association. The service is organized and supervised entirely by a committee of doctors. The treatment provided under the scheme will correspond with that given under the National Health Insurance Service and will include medicines. It will not however include midwifery, operations, or the service of specialists. The rates payable to secure the service range from £1:10 to £5:10 per annum according to the amount of income and the number in the family. Several hundred doctors have already indicated their willingness to take part in this service, and there is every reason to believe that the number will quickly increase when the principle underlying the scheme is more fully appreciated.

A development in the Highlands and Islands Medical Service in the way of providing the services of a consulting physician for the area is at present being considered by the local authorities and the medical profession in conjunction with the Department of Health. At the present time there are facilities for surgical consultations and for operative surgery. It is now suggested that a consultant physician should be appointed to the staff of the Royal Northern Infirmary at Inverness. Many people who at present cannot afford to have the services of a consulting physician from Aberdeen or the South would thus be in a position to secure first class advice.

In the Royal Infirmary of Edinburgh a new department has been opened for the orthopædic treatment of adults. The city already possesses an excellent orthopædic hospital for children which serves not only the city but the south-eastern region of Scotland. The new department will deal with the various disabilities incurred in childhood and also with those which are the result of accidents. It is suggested that this is only the beginning of a wider scheme to link up the orthopædic services for the region round one centre.

R. W. CRAIG.

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The London Letter

(From our own correspondent)

The Annual Report issued by the Ministry of Health is of the nature of a National Balance Sheet, and in the most recent issue, dealing with the period 1935-36, there were many reasons for satisfaction with the improved hygienic position. One striking feature of the year under review is the reduction of the maternal mortality rate for 1935 to less than 4 per 1,000 births, the lowest rate for ten years. The reduction appears to have been principally due to a decrease in the total number of deaths from puerperal sepsis, which in turn must be attributed in part to the recent striking chemical discoveries regarding the attack on the streptococcus. The infant mortality rate has fallen to a record low figure of 57 per 1,000 births, and indeed it is doubtful whether much more reduction in this particular line can take place except as regards the neonatal mortality, still unduly high. The tuberculosis mortality is also down to the lowest figure ever reached. Alongside of these successes there are naturally certain things which cannot be regarded with so much satisfaction. For example, during 1935 there was an increase in the number of prescriptions under the National Health Insurance Medical Service, so that the total now stands at sixty millions annually and the cost of drugs is rising. It has been pointed out, however, that if less people die, there must be more kept alive who require treatment, so that morbidity rates are likely to go up for some years, while mortality rates go down.

This question of the health of the nation is receiving attention from another quarter with regard to the proposed increased measures to promote the physical education of the youth of the country. Speaking in the House of Lords, Lord Horder recently emphasized that physical fitness can never be obtained by physical measures alone. There are still more basic things that are imperative, and the army authorities have recently proved, with a success which must have staggered the more complacent of the public health officials, that recruits rejected on the usual standards can be brought up to the accepted levels by a course of physical training, supplemented by good food. In other words, it is only shelving the nutrition problem if it is pretended that physique can be taught without satisfactory provision of the proper sort of food. Moreover, boys and girls still in the early part of their adolescence can be employed in industry for as long as fifteen hours a day and no amount of physical training can counteract the disastrous effect that such working conditions must have and does have upon their health. A new Factory Act is promised, and this also is probably of more importance in the long run for the nation's health than physical education.

One of the disorders responsible for far too much illness among the population of this country is rheumatism, and the Empire Rheumatism Council, which has just come into being, has as its object the organization of research throughout the British Empire into the causes and means of treatment of the group of rheumatic disorders. In Great Britain it is estimated that one-sixth of the total payments necessary under the National Health Insurance Act are made on account of some form or other of rheumatism, and probably one-quarter of the total loss to the community caused by illness is also due to this disease. The new council has the support not only of the medical profession but also of the leaders of industry, the trade unions and the insurance societies, and with such a backing it is certainly to be hoped that the necessary financial support will be forthcoming for launching organized research on a wide scale.

Yet another aspect of the nation's health and the health insurance work has come forward in the past few weeks when the annual conference of the local medical and panel committee representatives was held in London and discussed the capitation fee. It is twelve years since a court of inquiry fixed the present fee per insurance patient payable to insurance practitioners, and it is urged that there are many reasons why the time is ripe for an increase. Medical education certainly costs more than it used to do, and it is suggested that in consequence insurance practitioners are finding that assistants cost them more and the type of work carried out by insurance practitioners is said to be of a higher standard than ever before. It is also argued that panel patients are consulting their doctors more frequently. After considerable discussion it was carried unanimously at the conference that the case for an increase was sound, and by a large majority that the time for applying for such an increase was opportune. In consequence, the Minister of Health is to be approached. Returning thus to the same subject as that with which this letter opened, it is surely difficult to refuse to pay the medical profession more if the annual statistics of the nation prove conclusively that we are getting healthier and healthier!

ALAN MONCRIEFF.

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Topics of Current Interest

Animal vs. Vegetable Protein

The controversies of the latter part of the last century regarding the importance of protein in the diet were concerned chiefly with the relative importance of the nitrogenous components of the food to the other ingredients ingested. Beginning some thirty years ago with the pioneer work of Osborne and Mendel and of Hopkins, there developed the more modern interpretation of the importance of protein in nutrition. The value of any protein or food or ration in meeting the protein requirement of animals depends on the nature and the amounts of amino-acids yielded on hydrolysis. Proteins that are unsatisfactory for nutritive purposes are not toxic or poorly utilized but are lacking in one or more of the so-called essential amino-acids, which cannot be synthesized by the animal organism and must therefore be adequately supplied in the diet. The emphasis thus has been transferred from one of quantity of protein in the diet to that of quality of ingested protein.

The development of methods for the preparation of purified proteins and for their analysis for amino-acid composition, and the elaboration of procedures for determining the biological value of proteins,[1] have emphasized the importance of the individual amino-acid components of a protein in determining its value in nutrition. Investigators have clearly established that, in general, the proteins of animal origin are superior to the vegetable proteins for purposes of nutrition.

Within recent years, results have been made available on the effects of the prolonged ingestion of proteins of vegetable origin on a variety of functions. Since the diet of the majority of the Chinese people is largely vegetarian, extensive studies were conducted by Wu and his collaborators[2] at Peiping Union Medical College on the question of vegetarian diets with a laboratory animal of the omnivorous type. The white rat has proved ideal for this study; the high degree of standardization of the behaviour of this rodent, together with the opportunity which the rat affords for the study of successive generations, is of importance. It is obvious that the rate of growth, for example, of rats is not an adequate test of the value of a diet, if the animals used are born

1. LUSK, G.: Science of Nutrition, ed. 4, Philadelphia, W. B. Saunders Co., pp. 511 ff. MITCHELL, H. H. AND HAMILTON, T. S.: Biochemistry of the Amino-Acids, New York, Chemical Catalog Co., pp. 503 ff.

2. WU, HSIEN AND COLLABORATORS: Publications in *Chinese J. Physiol.*, from 1928 to present. Most recent publication, WAN, SHING AND WU, HSIEN: *Chinese J. Physiol.*, 1935, **9**: 119.

of mothers on a good diet and have been nursed by them. The true quality of the diet is revealed only in the offspring of these animals. It might be pointed out, therefore, that the testimony of human vegetarians is worthless, because they were probably not vegetarians during the first part of their lives, and they do not carry the test to the second generation.

The results of the studies of Wu and his group clearly demonstrate that animals ingesting a vegetarian ration grow at a slower rate than controls ingesting a mixed diet. Furthermore, the diminished growth rate is accentuated in successive generations. There is no decided difference in life span, however, and in view of the slower rate of growth it follows that the vegetarian rats attain a smaller final body weight than do the control animals. Fertility remains normal, but the ability of the experimental animals to nurse young is quite inferior to that of the rats in the stock colony. The basal metabolism of the vegetarian rats is somewhat lower than that found in the control omnivorous animal. A detailed study has been made of the weights and size of the various organs of rats of different ages on the vegetarian diet. Calculated on the basis of equal body weights, the organs, with the exception of the kidneys, liver, spleen and testes, of the vegetarian rats are heavier and larger than those of the omnivorous rats. The differences are statistically significant. The thyroid gland of the vegetarian rat is about three times heavier than that of the control. Adding iodine to the diet of the former reduces the thyroid to normal size, but has no effect on the growth curve or on the weights of other organs. This indicates that the poor growth of the vegetarian rats is not due to the lack of iodine in the diet.

There was little effect of the vegetarian diet, continued for many generations, on the gross physical characteristics or on the general health of the animal. It is of some significance that the vegetarian rats may grow to maturity and reproduce, even when continued for several generations on the same diet, without any sign of abnormality except the lowered growth rate. A diet which is so deficient as to be inadequate for growth and reproduction is easily recognized by its effect; it must be changed to a better one or the race will perish. In either case no weaklings remain. However, a diet that is slightly deficient and yet suffices to propagate the race after a fashion may never arouse suspicion and hence continues to exert its insidious effects. This is true not only of a strictly vegetarian ration but of any slightly deficient diet.—*J. Am. M. Ass.*, 1935, **105**: 438.

Abstracts from Current Literature

Medicine

Postural Hypotension with Special Reference to its Occurrence in Disease of the Central Nervous System. Ellis, L. B. and Haynes, F. W., *Arch. Int. Med.*, 1936, **58**: 773.

Normally the arterial blood pressure in man is maintained relatively stable in spite of marked variation in body posture. Failure of this postural adaptation may occur, with symptoms. Since Bradbury and Eggleston's original description of the clinical syndrome of "postural hypotension" in 1925 a total of 30 definite case reports have appeared in the literature. The authors review these and report an additional 6 cases. Each patient showed an immediate, profound and persistent drop in the arterial blood pressure in the erect position. The condition is characterized by attacks of syncope on standing, anhydrosis, slow pulse, increased distress during hot weather, a slightly low basal metabolic rate, and slight and indefinite changes in the central nervous system.

The etiology and mechanism of production of postural hypotension are discussed. Postural hypotension results from a failure of the sympathetic vasomotor reflex to produce vasoconstriction when the subject stands up. It has been shown that the centre controlling this reflex lies in the brain. Since the disturbance is widespread, the site of the lesion is either in a sympathetic centre or in an afferent pathway controlling the entire response, or is generalized throughout the efferent pathways. According to the authors, many instances of postural hypotension are associated with disease of the central nervous system.

The treatment is that of the underlying condition, mechanical measures, and drug therapy. Tight bandaging of the legs or abdomen, or both, sometimes offers considerable relief. The most valuable drug employed is ephedrine in doses from 25 to 50 mg. by mouth as frequently as necessary. Ergotamine tartrate, when administered parenterally, lessens the postural hypotension and may relieve the dizziness to some extent.

LEYLAND J. ADAMS

Observations on the Development of the High Blood Sedimentation Rate in Rheumatic Carditis. Coburn, A. F. and Kapp, E. M., *J. Clin. Investigation*, 1936, **15**: 715.

The practical value of serial determinations of the erythrocyte sedimentation rate as an aid in detecting the presence of rheumatic activity has been proved thoroughly among clinicians. The authors' studies, covering five years, show that in acute rheumatism the sedimentation

rate may be considered as a measure of the extent of the inflammation. The increased sedimentation rate in acute rheumatism is caused by an increase in the plasma fibrinogen and globulin. An immunological test for a quantitative difference between the plasma protein fractions of normal and rheumatic persons gave negative results. The authors suggest a possible mechanism to account for the rise in the sedimentation rate just before the onset of a rheumatic attack.

JOHN NICHOLLS

Surgery

Acute Pelvic Appendicitis. Brunn, H., *Surg., Gyn. & Obst.*, 1936, **63**: 583.

Drawing from his experience with 1,308 appendicectomies in a service where all the emergency work of San Francisco is done, the author believes that certain early signs have not been sufficiently stressed in pelvic appendicitis. The pain soon settled in the lower abdomen and more frequently in the left lower quadrant in this series. Irritation on urination was a frequent finding and sometimes dominated the picture, with 10 to 20 red blood cells per high power field. Desire for defæcation was frequent, and sometimes diarrhœa. Vomiting may or may not be present. Rectal tenderness should be searched for repeatedly. With the appendix lying on the pelvic brim there was frequently tenderness over Poupart's ligament, with increased muscular resistance. The temperature was usually normal for the first 24 hours, with elevation of 100 to 103° F. for the 24- to 48-hour period. The abdomen was usually soft, with very little localized tenderness for the first 24 hours. The white blood count was usually 15,000 to 20,000, and the sedimentation rate was not changed. He found the latter test of distinct value in differentiating from salpingitis, hæmorrhage from an ovarian follicle and ureteral calculus. Rupture and the development of generalized peritonitis was the most frequent complication and appeared inevitably. He advises the use of spinal anæsthesia and a right paramedian incision. Drains were not used except down to the peritoneum. Brunn does not believe in operative delay, even if the case is three days old.

FRANK DORRANCE

Generalized Peritonitis secondary to Rupture of the Appendix: Serum Therapy. Priestley, J. T. and McCormack, C. J., *Surg., Gyn. & Obst.*, 1936, **63**: 675.

The authors prefer not to operate on cases of generalized peritonitis secondary to rupture of the vermiform appendix, using the Ochsner type of treatment. Recently they have used Weinberg's serums as an adjuvant treatment with material benefit in a certain number. Thirty-two cases were so treated. Under medical treatment only the mortality was 50 per cent, in contrast to 80 per cent with those who did not have the serums; with delayed operation there was no mortality as contrasted with 30 per cent, and with immediate operation, performed because of individual-case consideration, there was 18.5 per cent mortality as contrasted with 24.6 per cent.

The initial dose given of Weinberg's serums was 40 c.c. of the polyvalent antiserum for the anærobes usually present, 30 c.c. of the colon bacillus serum, and 30 c.c. of the complementary serum (streptococcus, staphylococcus and others). They desire to have the case within 24 hours after perforation if they are to expect any help from the serums. Cultures taken at operation assist in determining future types of serums and the dosage. They did not hesitate to give large doses. Intradermal sensitivity was elicited before injection.

FRANK DORRANCE

Further Observations on the Treatment of Fracture Dislocations of the Cervical Spine with Skeletal Traction. Crutchfield, W. G., *Surg., Gyn. & Obst.*, 1936, **63**: 513.

In 11 applications of a skull tongs made by G. P. Pilling and Son, Company, Philadelphia, in only 1 case was there slight infection. This infection occurred in an emaciated, quadriplegic patient with osteomyelitis of the cervical spine after the tongs had been in use more than 3 weeks. Excellent reduction was obtained within 4 hours in dislocations of the upper cervical vertebræ with a traction usually in the neighbourhood of 5 pounds, and in no case exceeding 15 pounds. In posteriorly displaced dislocations of the lower three cervical vertebræ Crutchfield found it advisable to use pneumatic bag counterpressure to obtain satisfactory reduction. This tongs allows the patient to lie in the lateral position as freely as in the dorsal decubitus. The application of a plaster collar is usually permissible at the end of ten days' traction. The author believes this method of reduction should always be considered before laminectomy.

FRANK DORRANCE

Obstetrics and Gynæcology

Pulmonary Tuberculosis and Pregnancy. Young, J., *Brit. M. J.*, 1936, **2**: 749.

Pregnancy and labour may bring to bear upon chronic pulmonary tuberculosis an acute, critical and often lethal influence. A latent lesion may first reveal itself after the birth of a child. Robinson addressed a questionnaire to 200 specialists throughout the world, and, from their replies, concluded that "the chances appear to be nearly five to one against the effects of pregnancy being harmless to a tuberculous woman".

The factors accountable for the abatement of clinical features of pulmonary tuberculosis dur-

ing pregnancy may be suspension of the blood loss of menstruation, the safeguarding of calcium reserves, the increased rest and attention to general hygiene and, most important, the upward rising of the uterus and the splinting of the diaphragm with a consequent restriction of the lung movement. The sudden release of this upward thrust after labour, together with the straining incidental to delivery, leads to dissemination of the disease and to the aggravation which reveals itself during the puerperium. The puerperal crisis is the most sinister feature of the problem.

The management of the pregnant phthisical woman suffers from the dual medical control that obtains under the existing conditions and also from the transfer of the patient from a sanatorium to a maternity hospital. It is desirable that such women should be delivered in the sanatorium in which they are being treated for their medical condition.

The woman with active disease should be dissuaded from marrying, and, if married, from bearing children. In general, three years should elapse after the arrest of active disease before marriage or child-bearing is allowed, provided there is satisfactory x-ray and other physical evidence of healing. Where the prevention of pregnancy is of urgent importance, sterilization or birth-control measures should be adopted.

Abortion is the method of choice where the clinical condition is at the moment satisfactory but the state of the lungs such that full-time delivery may be dangerous. To give the maximum of protection the abortion should be performed in the first three months, the earlier the better. Abdominal hysterotomy carried out under spinal anæsthesia is quick, safe and relatively bloodless, carries less risk of sepsis, and sterilization can be effected at the same time. For cases unsuited because of severe pulmonary lesions for therapeutic abortion in the early months, and for all cases first seen in the latter months of pregnancy, gestation should be allowed to continue. During delivery the patient should be protected against hæmorrhage, shock, and sepsis. The phthisical patient is unfitted for nursing. The child should preferably be completely removed from the home until the active phase in the mother has been arrested.

ROSS MITCHELL

The Prevention of Puerperal Sepsis. Colebrook, L., *J. of Obst. & Gyn. of Brit. Emp.*, 1936, **43**: 691. – 714

Casualties from infection represent 50 per cent of the total deaths associated with childbirth—about 1,200 to 1,500 deaths per annum in England and Wales, and about 6,000 to 7,000 non-fatal infections. The author divides puerperal sepsis into two groups: (1) those cases which are intimately associated in their origin with injury to maternal tissues during the process of childbirth; (2) the cases where there was no trauma and hæmolytic streptococci have been introduced into the genital tract by the mother. The first group is not always of *S. hæmolyticus* origin, because the anaerobic and other non-hæmolytic varieties of streptococci, *B. coli*, and staphylococci play a part where the tissues are devitalized from trauma. Only 10 per cent of the 2 to 3 per cent of women having hæmolytic streptococci in the vagina at the onset of labour had fever during the puerperium. The author believes these to be of a different strain. There are several types of hæmolytic streptococci; only one of these is responsible for severe puerperal fever and this organism is rarely found in the genital tract at the onset of labour. Eleven per cent of people with pyorrhœa showed non-hæmolytic streptococci in the blood, entrance probably being gained by trauma from chewing and brushing the gums. Seven per cent of the population have pathogenic hæmolytic streptococci in the pharynx, yet do not exhibit any clinical signs of infection in the throat. These organisms are not found on the perineum and circumanal skin of normal women. Nearly 4 per cent of normal women have streptococci on the hands. Tonsillitis, scarlet fever, mastitis, erysipelas, burns, whitlows, and minor infections of the fingers are potential sources of these hæmolytic streptococci. It is possible to group the type of streptococci and therefore lead to the source. The author has enumerated the main sources of puerperal infection as: (*a*) hæmolytic streptococci from respiratory tract, especially acute infections; (*b*) healthy carriers; the pharynx infested with streptococci, yet without no clinical sign; (*c*) infection from attending staff, direct contact, and airborn particles. He has made a careful study of these main sources of infection. He recommends the use of Dettol antiseptic for midwifery.

P. J. KEARNS

Pædiatrics

The Effect of Dietary Protein on the Urea Clearance of Children with Nephrosis. Farr, L. E., *J. Clin. Investigation*, 1936, **15**: 703.

In so-called "pure lipoid nephrosis" in children the urea clearance is frequently elevated markedly above the normal level. The urea clearance may also be elevated in some children with hæmorrhagic Bright's disease with a decided nephrotic component. The nature of this paradox, renal hyper-function in the presence of renal involvement, is not entirely clear, and the present work was undertaken in an attempt to elucidate the rôle of diet in this phenomenon.

In 4 children, aged 4 years, with the nephrotic syndrome the urea clearance was

found to vary markedly with the protein intake. Protein intakes of 0.5, 1, 2, 3, and 4 grams per kilo. per day were accompanied by average clearances of 73, 88, 178, and 216 per cent of the mean normal, respectively. The creatinine clearance showed variations similar to those of the urea clearance.

The administration during the protein periods of amounts of urea sufficient to produce urea outputs like those observed during high protein intake caused relatively slight increase in urea clearance. It appears therefore that the stimulus to renal function by high protein diets is due to substances other than urea.

The effect of varying protein intake on urea clearance in the author's patients was similar to that observed in the dog by Van Slyke, Rhoads, Hiller and Alving. It therefore appears probable that, as demonstrated in their experiments, the clearance changes indicated parallel changes in the blood flow through the kidneys.

The effects of protein intake on urea clearance in the case of the author's young patients were much greater than the similar effects observed in adults, either normal or suffering from renal disease. The author states it remains to be ascertained by control observations on normal children whether the observed lability of the clearance is common to young children, or in those studied was due to the combined effect of early age and the nephrotic syndrome.

JOHN NICHOLLS

Ophthalmology

Observations on Spasm of the Central Artery of the Retina. Sedan, J. and Jayle, G. E., *Ann. d'Ocul.*, 1936, **173**: 609.

Visible with the ophthalmoscope, the retinal vessels offer an easy field for study, and consequently spasm of the vessels here may be easily observed and verified. Bailliart said recently, "We have without doubt used retinal spasm to explain cases in which the origin was very different". This tendency has started numerous discussions in the literature on which one of the authors, with Aubaret, has drawn attention in a report on "Vascular Spasms in Ophthalmology", which was presented to the Congress of Ophthalmological Societies in April, 1928. A critical rearrangement of the facts is now necessary.

Because of the difficulty of deciding upon the etiological circumstances, the authors have tried to study those beginning from a single constant symptom in the course of a retinal spasm, that is, visual disturbance. Visual defects due to contractions of the central arterial trunk or its branches may be classified satisfactorily with the form of St. Martin, either recurrent or protracted.

The first part given in this Number deals with I. Recurrent Visual Troubles of Spasmodic Origin, in which are taken up scotomas, amblyopias, retinal migraines, recurrent amblyopias from vascular or circulatory causes. This is divided into recurrent amblyopias from hypertension of arterioles, and from hypotension. Recurrent amblyopias from different causes, (*a*) in the course of an affection of the central nervous system; (*b*) in the course of intoxications or auto-intoxications; (*c*) in the course of general affections; (*d*) in the course of ocular affections; and (*e*) of dental or nasal origin are considered. The article is to be continued.

HANFORD MCKEE

Nodules Obtained after Intra-vitreous Inoculation of Trachomatous Material; Are they Specific? Busacca, A., *Ann. d'Ocul.*, 1936, **173**: 528.

In a previous article in November, 1934, Busacca demonstrated the presence of micro-organisms of the rickettsia type in human trachomatous tissue, and reported his researches following the inoculation of human trachomatous material into the different organs of rabbits and white mice. These researches were reported in full at the International Congress at Madrid in 1933.

The experiments were all made by inoculating fragments of trachomatous pannus from the limbus area in patients having numerous nodules in this region. The pannus area was chosen as likely being more sterile than other parts. The removed material was diluted in 2 c.c. of physiological solution, then inoculated.

The author gives his experiments in detail, and notes the reaction of the eye of the chicken to inoculation of human trachomatous material, to the inoculation of material conserved in glycerine, and the reaction which is found in ocular tissues after intravitreous inoculation with this material. He concludes with histogenesis of the nodules and result of the inoculations; the controls. The article is profusely illustrated.

HANFORD MCKEE

A Little Known Professional Malady: Intoxication from Gas proceeding from Certain Submarine Sources where Men Work in Diving-bells. Barrat, P. and Seigner, A., *Ann. d'Ocul.*, 1936, **173**: 513.

In this communication an attempt has been made to publish knowledge acquired about a rare and little known disease which develops with the now more frequent use of diving-bells. This is a form of general intoxication, with symptoms of headache, vertigo, vomiting, pupillary and local phenomenon, such as acute coryza, conjunctival disturbance, tearing, etc. The ocular phenomena are always present, and

sometimes they are the only ones. This no doubt is due to the great fragility of this membrane, and perhaps to an elective action of the agent causing it. The affection is most interesting to ophthalmologists, and for this reason attention is drawn to the condition which is caused by a mixture of gases proceeding from the putrefied bodies of marine animals held in the clay mud for many years. Twenty-three observations are given in detail.

HANFORD MCKEE

Urology

Strictures of the Prostatico-membranous Urethra. Young, H. H., *Ann. Surg.*, 1936, **104**: 267.

The author presents some of newer methods he has employed in the management of the difficult strictures of urethra. First he describes the use of urethral tubes in cases of stricture which was deep-seated, eccentric, or surrounded by pockets in which filiforms would engage. The tube gives support to the delicate filiform and thus prevents it from doubling upon itself, both during passage through the stricture into the bladder, and subsequently while conducting a follower to the deep urethra and through the sphincter.

The author next discusses the use of the cystoscope through a suprapubic sinus to pass filiforms, retrograde, from the bladder through the strictured urethra. To a filiform passed thus a dilating bougie is screwed on, and the stricture is thus dilated. No metal instrument could be used for this. At times such a retrograde passage of a bougie is not satisfactory, as not enough pressure can be exerted on the flexible bougie. In these cases another filiform is attached by means of a coupling tube to the one passed retrograde, so that the second filiform can be drawn out until its screw end projects from the meatus, and dilating followers are then attached to it. The use of the cystoscope to pass filiforms retrograde is however troublesome and often difficult. Therefore, the author finds it desirable to leave a piece of silkworm gut in the urethra, with one end coming out of the suprapubic sinus tied to the other end leaving the external urethral meatus. Then, for subsequent dilatation of the stricture, he uses the piece of gut attached to a filiform via an appropriate connecting piece to draw the filiform through the urethra. After plastic operations in which dilatations must be carried out soon the author always leaves a fine thread of silkworm gut in place, and at an appropriate time after the operation he uses this simple but important aid to dilate the urethra.

N. E. BERRY

Vascular Obstruction of the Ureter in Children. Campbell, M. F., *J. of Urol.*, 1936, **36**: 366.

Vascular obstructions of the ureter, in the nature of aberrant arteries and veins, constitute a commonly unrecognized and frequently undiagnosed condition. The author believes that the greatest field for preventive medicine lies in the early recognition and treatment of congenital urological handicaps, the most satisfactory results being obtained if treatment is instituted at the time the first evidence of urological disease is manifested.

In about 6 per cent of all persons anomalous vessels traverse the ureter and are an important potential cause of ureteral compression; however, the number which cause actual obstruction are considerably below this figure. It is assumed that the irritation of the pulsation of an aberrant artery against the ureter disrupts or inhibits peristalsis and induces urinary stasis. The cumulative effect of compression and irritation results in hydronephrosis, which aggravates the obstruction and the vicious cycle is established. Infection soon becomes manifested and the kidney parenchyma is ultimately destroyed by the combined effects of back pressure and infection. The author has not infrequently observed the signs and symptoms of an acute toxic nephritis affecting the opposite kidney, in cases where such a suppurative focus was present in the obstructed and impaired mate.

The symptoms of aberrant vessel blockage of the ureter are those of hydronephrosis, either with or without infection, and are characteristically intermittent. The principal manifestations are pain, pyuria, disturbances of urination, hæmaturia, a mass in the loin, and sometimes fever.

The treatment of vascular obstruction is entirely surgical, the type, whether plastic or radical, depending entirely on the amount of damage existent in the kidney at the time of recognition. Unfortunately the medical profession is as yet insufficiently alert to the high incidence and importance of urological disease in children. Because of the consequent delay in making the diagnosis, nephrectomy will necessarily be the treatment in fully half of all children with vascular ureteral blockage.

J. V. BERRY

Dermatology

Etiology, Pathology and Treatment of Leukoplakia Buccalis. With a Report of Three Hundred and Sixteen Cases. McCarthy, F. P., *Arch. Dermat. & Syph.*, 1936, **34**: 612.

The author classifies leukoplakia into four grades, based upon clinical appearance and etiology, and gives the treatment indicated in each type.

Grade 1 consists of red, granular, sharply defined and slightly tender patches, which after a short time become slightly whitish grey. They are purely inflammatory, without definite epithelial proliferation, and are due to faulty occlusion of either natural teeth, artificial partial or full dentures, especially beyond middle life. As an additional factor tobacco plays an important rôle. The condition occurs in the mucous membrane of the cheeks or gingival crest. Dental correction is usually effective.

Grade 2 appears as bluish-white patches or plaques, without palpable induration but sharply outlined from the normal mucosa. The corium shows definite hyperkeratosis and acanthosis with a slight cellular reaction. It is produced by chronic irritation due to causes other than smoking, such as carious teeth, oral electric currents, dental appliances, habitual biting of cheeks, hot and spicy foods, and chewing tobacco. An important factor in all leukoplakia, but especially in this group, is chronic periodontal infection. The edentulous mouth, with properly fitting artificial dentures, or with none at all, tends to remain free from leukoplakia. Electrolytic currents are not thought to be an important factor. Chemical irritation may arise from improperly vulcanized plates.

Grade 3. This is the milk-white, pearly or silvery indurated plaque, localized or covering a large area. There is marked hyperkeratosis, with acanthosis and cellular reaction of the corium. Smoking is generally recognized as the most important factor in the production of leukoplakia, especially of this type. The most common location is the buccal mucosa at the angles of the mouth, probably from exhaling smoke at the corners of the mouth. It is rare to find leukoplakia of the dorsum of the tongue in non-smokers; even a patient with pre-existing syphilitic glossitis does not have leukokeratosis of the atrophic mucous membrane unless addicted to tobacco.

Grade 4. The plaque is indurated and leathery and beginning to show evidence of malignancy, recognized by early erosion, fissuring or a tendency to warty proliferation of the surface. It should be treated as an incipient malignant neoplasm. A high percentage of cases of extensive leukoplakia of the tongue is definitely related to syphilis, but there is no evidence to indicate such relationship in the greater number of instances of leukoplakia elsewhere in the oral cavity. A predisposing factor in leukoplakia of the tongue is atrophic syphilitic glossitis. The characteristic picture of this is smooth, red atrophic areas interspersed with more or less generalized leukoplakic lesions. There are frequent modifications due to a sclerotic process with secondary lobulation due to contraction of the interstitial connective tissue. In contrast to this is the reaction of the normal tongue in heavy smokers in whom hypertrophy and leukoplakia are confined to the papillæ, producing thick rough whitish surfaces.

Atrophic glossitis occurs in prolonged secondary and pernicious anæmia, and leukoplakia may be independent of tobacco but caused by hot spicy foods. Leukoplakia of the tongue in women is associated with atrophic glossitis due to primary or secondary anæmia. Differential diagnosis must be made from syphilitic lesions (mucous patches), lichen planus, oral lupus erythematosus and exudative processes in the mouth. The subsequent malignant growth is always squamous-celled, but tends to be low grade. The ulcerative indurated type develops into the growth with the highest degree of malignancy. The author is opposed to radiotherapy. He uses electro-dessication and electrocoagulation and the monopolar and bipolar high frequency currents, where there is any tendency to malignant change. Smoking should be forbidden. D. E. H. CLEVELAND

Therapeutics

The Radiumhemmet Method of Treatment and Results in Cancer of the Corpus of the Uterus. Heyman, J., *J. of Obst. & Gyn. of the Brit. Emp.* 1936, **43**: 655.

The author reviews twenty years' treatment of carcinoma of the corpus uteri, from 1914 to 1935, and has collected 460 cases of this condition. A detailed analysis is made of the last ten years. The most important question is how to distinguish corpus cancer from the other forms of uterine carcinoma, because in a considerable number of cases cancer can be demonstrated histologically in both cervix and corpus uteri. Cases with cancer in both uterus and ovaries provide another group which is difficult to classify. About 50 per cent of those examined were advanced cases of corpus carcinoma. A special group for the doubtful cases should be made, as in pre-cancerous changes with doubtful carcinoma. A ten-year permanent cure estimation greatly reduces the permanent cure cases. The five-year permanent cure rate was 42.2 per cent, when radiological treatment chiefly was used. This percentage was augmented when a homogeneous irradiation of the whole uterine cavity, by packing the uterus with less powerful tubes filling the entire cavity, was used. This required from 8 to 20 cylinders, according to the size of the cavity. On the basis of previous empirical experience the author has adopted a dose of 1,500 mg. el-hrs. given twice at a three weeks' interval, and using ten tubes of 8 mg. Ra-el in metal cylinders without a cover. Since this method has been used the 5-year, 3-year, and 2-year results are better.

P. J. KEARNS

Radium Irradiation for Benign Hæmorrhage. Norris, C. C. and Behney, C. A., *Am. J. Obst. & Gyn.*, 1936, **32**: 661.

To secure good results from irradiation the cases must be carefully selected. This requires not only correct judgment but diagnostic and histological skill. The destructive effects of irradiation, while being the direct means by which the hæmorrhage is checked, also constitute a definite drawback to this form of treatment.

In a study of 1,437 cases of benign hæmorrhage treated by means of intrauterine radium irradiation, 750 were cases of functional hæmorrhage, and 687 of myomas. One thousand and six patients of the entire series were followed up for two years or more, and 300 of these patients have been observed over a period varying from ten to twenty years. Menopausal symptoms occurred in 59 per cent of 967 reported cases of functional hæmorrhage and myomas. Satisfactory results were secured in 83 per cent of the group. The myomas yielded about the same proportion of satisfactory results as did the functional hæmorrhage cases. Three per cent developed relapses or complications requiring treatment ten or more years after irradiation. The proportion of cases in the followed-up group in which carcinoma of the genital tract developed after irradiation was 1.09 per cent. The mortality in the entire group was 4 patients, or 0.278 per cent.

ROSS MITCHELL

Pathology and Experimental Medicine

Effect of Total Thyroidectomy in Man. Laboratory Studies and Observations of Clinical Effects in 39 Cases. Schnitker, T., VanRaalte, L. H. and Cutler, E. C., *Arch. Int. Med.*, 1936, **57**: 857.

The authors have taken advantage of the material made available by 39 thyroidectomies for cardiac cases to make studies of the blood before and after operation, and to examine the changes in other parts of the body metabolism. The operations were done for angina pectoris (22), chronic heart failure (15), and diabetic gangrene (2).

(1) Angina pectoris—There was great variation in the degree of myxœdema necessary to obtain relief from symptoms. About a 9-weeks' post-operative interval was required before myxœdema was established. The best maintenance level was usually found to be –20 basal metabolic rate. One-quarter of a grain of thyroid extract apparently kept patients at this level. (2) In cardiac failure a greater degree of myxœdema than minus twenty was needed for a desirable result.

The cholesterol content of the blood rises with the onset of myxœdema as high as 744 mg. per 100 c.c. A sharper rise was noticed in angina cases than in cardiac failure. This test is perhaps more reliable than the basal metabolic rate.

Vital capacity registered no significant change after operation. Volume of blood flow —There is some slowing as the basal rate falls. The calcium content fluctuates but remains essentially within normal limits. There seemed to be no definite change in the blood protein or potassium. A marked rise in the iodine content seemed to occur in the first week after operation.

Sugar—Thyroidectomy had a beneficial effect on cases of glycosuria or hyperglycæmia in a large series of Crile's cases, with almost always a lowering of the sugar-tolerance curve. The theory for doing this operation for diabetic gangrene is that if the demands of the body metabolism are lowered a circulation, before inadequate, might be enough to take care of such a situation. In both cases healing of the extremity resulted, whether from lowered metabolism or from vasodilatation caused by thyroidectomy, or both. The diabetic also was benefited. The temperature of the skin was studied with the relationship of the thyroid, adrenals and sympathetic system in mind. The temperature rose after operation, higher in the cardiac failure cases than those with angina. Apparently vasomotor tone is diminished, allowing a greater blood flow through the smaller blood vessels. Later, when myxœdema was present, the temperature of the skin became lower.

A comparison is made between spontaneous and induced myxœdema. The 100 spontaneous cases included 26 cases of cardiac disease which obviously would not be helped by thyroidectomy. No explanation for the relief produced in anginal cases can be found. The fact that it follows the operation so promptly suggests an anatomical connection.

Post-operatively almost all the authors' patients suffered from muscular pain in the legs which was relieved by thyroid therapy.

P. M. MACDONNELL

The Duplication of Congenital Malformations in Brothers and Sisters and among other Relatives. Murphy, D. P., *Surg., Gyn. & Obst.*, 1936, **63**: 443.

From a series of 884 families with a malformed child 40 families were obtained with two or more children exhibiting a malformation. In about 50 per cent of the cases the same defect was reproduced in the subsequent deformed children, and in about 50 per cent a second malformation appeared. In some of the families in which the defect was repeated in a second child, a third child in the family might have a dissimilar defect. In 39 of the 40 families there was a history of a malformation

in the relatives, aside from siblings. In 20 families the defect was on the mother's side of the family, and in 19 on the father's side of the family. From these observations, Murphy concludes that congenital malformations are primarily the result of influences which affect the germ cells before, rather than after, fertilization. This conclusion is strengthened by several of the family histories. In one, there were three children with pyloric stenosis, two of these being twins. In a second family, there were two children, both by the same father but by different mothers, who had cleft palate. In a third, there were two children who lacked the right half of the diaphragm. Such sequences of events could scarcely be attributed to forces acting after fertilization. The practical application is that a clinician, having seen a mother give birth to a malformed infant, is in a better position to predict the nature of the defect in an unborn child than he would be were malformations not apt to be duplicated. Since malformed children are 24 times as apt to occur in families where one child has been born malformed, these findings are of practical value. They aid the physician in predicting the liability of the mother to have a second malformed child when she has already given birth to one.

MADGE THURLOW MACKLIN

Obituaries

Prof. Oskar Klotz

We record with regret the death of Prof. Oskar Klotz, which occurred on November 3, 1936. His passing marks a great loss to scientific medicine. Dr. Klotz was the son of the late Dr. Otto J. Klotz, Director of the Dominion Observatories, Ottawa, and was born at Preston, Ont., on January 21, 1878. His early education was at the Galt and Ottawa Collegiate Institutes. He received his M.B. degree from the University of Toronto in 1902, his M.D., C.M. degree at McGill University in 1906. He did post-graduate studies at McGill in Montreal, and in Germany at the Universities of Bonn (1905), Freiburg (1908), and Marburg (1914). He was House Physician at the Ottawa General Hospital in 1902, Superintendent of the Ottawa Civic Hospital for part of 1903. He became Governor's Fellow in Pathology at McGill (1903-05), a Fellow in Pathology of the Rockefeller Institute (1905-06), Demonstrator in Pathology and Bacteriology at McGill (1905-07), Assistant Pathologist, Royal Victoria Hospital, and Pathologist to the Maternity and Alexandra Hospitals, Montreal (1905-09), Lecturer in Pathology at McGill (1907-09). In the autumn of 1909 he went to the University of Pittsburgh as Professor of Pathology and Bacteriology, which position he held until the end of 1920, and during this period he was Director of the Laboratories of the Mercy Hospital, Director of the Magee Hospital Pathology Laboratory, and in 1916-19 Consulting Pathologist to the United States Bureau of Mines and the War Department at Washington. The eleven years in Pittsburgh were important not only in his own development but also in establishing Pathology in that community. He was Professor of Pathology, Faculdade de Medicina, Sao Paulo, Brazil, from 1921 to 1923, having been appointed by the International Health Board of the Rockefeller Foundation. He carried with him to Brazil the very best of North American pathology and left a deep impression on his colleagues there. He returned from South America in 1923 to fill the position of Professor of Pathology and Bacteriology in the University of Toronto, his Alma Mater, and he also became Director of the Pathological Laboratories, Toronto General Hospital, Consulting Pathologist to the Hospital for Sick Children, and, in 1934, Honorary Consultant in Pathology, Department of Health of Ontario. During these years in Toronto he had working with him many young graduates from Pittsburgh, and from Brazil were sent by the Rockefeller Foundation Dr. Cunha Motta, Dr. A. de G. Magalhaes, and Dr. C. Magarinos Torres.

Dr. Klotz held a number of positions in various Commissions, Councils and Societies among them being: Member of the Associate Committee on Tuberculosis from 1925, and Member of Council since 1932, National Research Council of Canada; member of the Yellow Fever Commission (Special) of the International Health Board in 1926 and 1928, and he spent six months of these years in Nigeria, developing on his return voyage in 1928 a severe attack of tropical malaria; Joint Chairman of the Committee for Canada of the International Society of Geographical Pathology in 1929, and was one of the two representatives for Canada at the meeting in Utrecht, Holland, in 1934—the topic of the symposium being arteriosclerosis; Member of the Ontario Branch of the St. John Ambulance Association, 1933—and Member of Council from 1935 on; Member of Toronto Health League from 1933; Member of the Cancer Commission of Ontario and Chairman of the Sub-Committee on Research since 1934; Member of Medical Advisory Committee in conjunction with the Ontario Society for Crippled Children from 1935; and Honorary Life-member of the Hamilton Health Association, 1936.

He had been in charge, since 1918, of the reviews in Pathology and Bacteriology for the Progress of Medical Science department of the *American Journal of the Medical Sciences.*

The scientific societies to which he belonged, and in many held office, were: Academy of Medicine, Toronto (President, 1935-36); American Association of the History of Medicine (Councillor, 1935); American Association of Pathologists and Bacteriologists (President, 1919); American College of Physicians (Fellow, 1924); American Society of Parasitologists; American Society of Tropical Medicine; Association of American Physicians; Association of Medical Museums (President,

1919); Canadian Medical Association; International Society for the History of Medicine; Ontario College of Physicians and Surgeons; Ontario Medical Association; Pathological Society of Great Britain and Ireland; Royal Canadian Institute (Councillor, 1935); Royal College of Physicians and Surgeons of Canada (Fellow, 1931); Royal Society of Canada (Fellow, 1928); Society for Experimental Biology and Medicine; Society for Experimental Pathology (Councillor, 1932; President, 1935); Society for Tropical Diseases (Corresponding Member).

He was a member of the York Club, Toronto; Arts and Letters Club of Toronto, and belonged to Zeta Psi, Alpha Omega Alpha, and Nu Sigma Nu fraternities.

He was married to Stella M. Scovil, daughter of the late Mr. T. K. Scovil of Portland, Ontario, on March 4, 1908. There were no children.

Dr. Klotz' work covered the whole range of Pathology and Bacteriology, but he is most widely known for his work on arteriosclerosis and other diseases of the arteries, which was one of his most active interests throughout all of his scientific career. These studies led to the formulation of the theory of pathological calcification with which his name is now generally associated. Although he was an ardent opponent of Thoma's theory of medial weakening and compensatory hyperplasia of the intima, he himself was much interested in diseases of the media of arteries and was largely responsible for the introduction of the concept of "medial arteriosclerosis". Diseases of the media formed the subject of a long monograph published in 1911, while later publications dealt in further detail with the medial lesions associated with rheumatic and syphilitic infections and the changes responsible for the occurrence of aneurysms and spontaneous ruptures of the aorta. Arteriosclerotic lesions affecting the intima likewise attracted his attention. He was especially interested in arteriosclerosis of the coronary and renal arteries and made numerous contributions to the literature of coronary sclerosis and cardiovascular renal disease. His experimental studies of earlier years strongly influenced his ideas on the etiology of arteriosclerosis, and he constantly supported the view that infections, intoxications and overwork, with consequent fatigue of the arterial musculature, were etiological factors of first importance. His masterly discussion of arteriosclerosis before the meeting of the American Association of Pathologists and Bacteriologists in Toronto in 1934, and the exhaustive review of experimental arteriosclerosis presented before the International Society of Geographical Pathology in Utrecht in the same year, formed together a fitting climax to a life-time of research on this subject.

During the last fifteen years of his life he became attracted by the problems of tropical diseases, but particularly those of yellow fever. During his stay in Sao Paulo, Brazil, in 1921 to 1923, and as a special member of the Yellow Fever Commission of the International Health Board of the Rockefeller Foundation in Nigeria, in 1926 and in 1928, he came in intimate contact with all phases of yellow fever and took a prominent part in its scientific study. He was probably the leading authority on the pathological diagnoses of the disease in man and animals, and the evidence he collected established the identity of the yellow fever of West Africa with that occurring in America. The West African studies eliminated as causative agents any visible microorganisms and the endeavour was made to discover a susceptible animal other than man for experimental purposes. Having failed to find such in West Africa his suggestion that wild animals from countries free from yellow fever be investigated led to the brilliant studies which established the virus nature of the disease.

Dr. Klotz was a really great teacher, enthusing his students with the principles of scientific study, the importance of the historical background, always making clear the probable nature of future progress. His laboratories were filled with eager research workers, and these he inspired by his unrelinquishing demand for exact, honest and unprejudiced study, as well as precise records of all phases of their work. His own laboratory records are models for accuracy, completeness and keen observation. He expected, as he gave, the best of a man's qualities. He was ever alert to new ideas and the enthusiastic suggestions of the younger men received his sympathetic attention, but he was intolerant with those who were not serious in their dealings with him. Being himself unsparingly energetic, decisive and clear-thinking, he gave to all that sense of security and definiteness of purpose so essential in the chief of a scientific department. His executive ability would have assured a brilliant success in many lines of endeavour, and he was often called upon to help in the organization and clarification of many problems outside his own particular field.

The richness of his experiences and the wide and detailed knowledge which he had accumulated in a life of unusual fullness are only to a very small degree retained for his followers in well over a hundred important scientific papers, as well as a long list of masterly addresses on a great variety of subjects. The loss to medical science of one in the very prime of his productivity is indeed a tragedy, but he will long live through the splendid influence which he exercised on all with whom he came in contact.

The poem "Recompense", written by his dear friend, the late Dr. John McCrae, seems an appropriate remembrance:

I saw two sowers in Life's field at morn,
To whom came one in angel guise and said,
"Is it for labour that a man is born?
"Lo: I am Ease, Come ye and eat my bread!"
Then gladly one forsook his task undone
And with the Tempter went his slothful way,
The other toiled until the setting sun
With stealing shadows blurred the dusty day.

Ere harvest time, upon earth's peaceful breast
Each laid him down among the unreaping dead.
"Labour hath other recompense than rest,
Else were the toiler like the fool," I said;
"God meteth him not less, but rather more
Because he sowed and others reaped his store."

W. L. HOLMAN

AN APPRECIATION

While the scientific interest of Oskar Klotz was wide and extended over many fields, it centred almost from the beginning in the diseases of the arterial system. His contributions to this chapter of pathology alone were numerous, and will preserve his name among pathologists. In the earliest of these publications on calcification (1905), done while still at McGill, he formulated a new concept on calcification of arteries based on microscopic chemical methods, and though subsequent observations have modified and altered his conclusions this work remains noteworthy as an attempt to trace strictly causally the structural steps of these arteriosclerotic changes. Subsequently (1906) he carried on experiments in animals on the production of arteriosclerosis by mechanical changes in blood pressure in suspending rabbits upside down for half an hour every day over longer time periods. He found in these experiments sclerotic lesions of the vessels of head and neck. But his most important contributions appeared later in connection with the "rheumatic" and other infectious and regressive lesions of arteries. Here he was one of the pioneers. His contribution on "Rheumatic Fever and the Arteries" before the Association of American Physicians (1912) was a clear, well marshalled, concise, and conclusive presentation of an insufficiently recognized subject, separating the lesions from those of syphilis, with which they had in the past probably often been confounded. It remains a valuable contribution to the whole subject of "arteritis". He added to it by a later article on "periarteritis nodosa". The interest in

arteries continued in his and his associates' work on a peculiar arterial medial necrosis in relation to aneurysms and particularly spontaneous rupture of larger vessels (1932). He extended and enlarged in this connection isolated previous reports by Erdheim and others, and entered fully into the possible character of these lesions. His Gordon Bell Lecture dealt exhaustively with aneurysms.

While a good part of his time and energy were thus consumed, Klotz never became one-sided. He contributed, in his Pittsburgh days, a detailed account on the pathological anatomy of influenza, and he never lost interest in the etiological infectious side of pathology. His most outstanding work in this field was the wide and broad study of yellow fever, of which there are eight notable papers, partly in association with others. They cover his own immediate experiences with the disease, as well as the results of experimental infection, and touch upon almost every phase of the problem of yellow fever in a comprehensive way. In the DeLamar lectures (1927-28) there will be found a wealth of information regarding this disease. The subsequent papers on the anatomical changes in the spleen, liver, and liver regeneration following yellow fever have added materially to our knowledge of the pathological anatomy of this infection.

While only what are perhaps his outstanding studies have here been briefly mentioned, it may be said that all his writings show careful preparation and an infinite zeal for detail and thoroughness; this applies not only to his own work but to the valuation of the researches of others.

Pathology has lost in Oskar Klotz a serious investigator and teacher, whose life and activities have helped in many ways to move it forward as a science and as an aid to the practice of medicine. HORST OERTEL

Dr. Alexander Gillespie passed away at the home of his son, Dr. W. Fulton Gillespie, on November 12th, in his 83rd year.

AN APPRECIATION

He was born on a farm near Peterborough on February 5, 1854, and continued in his parental home until the age of sixteen, when he became an apprentice in a waggon shop for a few years, becoming a skilled wood-worker. This, however, was not his choice of life work, as the practice of medicine and surgery was the dream of his youth, and to this end his studies were directed. He entered Trinity Medical School and graduated with honours in 1884, being one of three to win the Trinity Medical School Fellowship. Following graduation he went to Edinburgh for a year, and obtained the diploma of L.R.C.P. Subsequently he spent another year in Europe visiting various medical centres.

He returned to Canada from Edinburgh in 1885, and began practice in Manilla, then moved to Lindsay, at which points he spent the first twenty-one years of his professional life.

In 1906 the lure of the West took possession of him and he moved to Edmonton, where he continued to practice until about four years ago, when he was forced to give up active work owing to ill health.

In 1885 Dr. Gillespie married Sarah Campbell, of Manilla, who predeceased him eight years ago. From the union three children were born, Col. Allister C., who died two years ago, Dr. W. Fulton, one of the leading surgeons of Edmonton and instructor in surgery of the Medical Faculty of Alberta University, and a daughter Annie (Mrs. C. I. Grierson), of Toronto.

During the Great War the doctor was in khaki with the rank of Major, as president of the standing Medical Board at the Edmonton Armories. In 1933 his confrères in Alberta made him Honorary President of the Alberta Medical Association, a like honour being bestowed by the Edmonton Academy of Medicine, of which body he was an Honorary Member.

It is now twenty-six years since the writer made his acquaintance, and during these years there has been an ever increasing conception of his true worth, his splendid mind, his skill as a diagnostician, and his marked efficiency as a surgeon. He made few close friends, but his friendship rang true where it was given, and those of us who were fortunate enough to be included in this circle are going to feel his loss.

"The book is closed, the prayers are said,
And he is part of the countless dead,
Thrice happy his soul shall be if some can say,
'I lived because he passed my way'"

and many will say it. J. S. WRIGHT

Dr. Joseph Henry Radford. On November 7th Joseph Henry Radford, M.B., of Galt, Ont., passed away suddenly from heart trouble in his 81st year.

Dr. Radford was born on a farm near Perth, Ont., in 1856. He was one of a family of eleven children. After receiving his high school education at Perth he taught school for four years. He graduated in medicine from the University of Toronto in 1879. The following year was spent as an intern at the Toronto General Hospital. In 1880 he began to practise his profession in Galt. Two years later he was married to Mary Philip, daughter of Dr. John Philip of that town.

Few doctors gave so much of their time to the public service in their community as the late Dr. Radford. For fifty-three years he held some public office. He was a member of the public school board for nine years, eight years of that time as chairman, and later he served two years on the high school board. He entered the town council in 1890 and was mayor for three years, retiring in 1899. In 1900 he became an elected member of the public utilities commission on which he served for sixteen years, retiring to become the M.O.H. in 1916. For twenty years he served his city in this capacity and as medical officer of the schools, retiring from these positions at the end of 1935.

Dr. Radford always enjoyed a large practice during the forty-five years he served as a general practitioner. He was a past president of the South Waterloo Medical Society and of the Ontario Health Officers' Association, and only two days before his death attended the regular monthly meeting of the former society and spoke on the treatment of scarlet fever. He was also a life-member of the Ontario Medical Association.

He was a member of the Masonic Order, the Oddfellows, of the Presbyterian Church, and in politics was a Conservative. He is survived by one daughter, Mrs. A. M. Stewart, of Galt, and two grandchildren.

The late Dr. Radford was well liked by his fellow practitioners, and his assistance was often sought by them in solving their medical problems. He attended regularly the hospital staff and county society meetings. To the writer of this appreciation he was a dear friend, and as a fellow officer of health gave him much assistance. Although eighty years of age, to most of his friends he seemed nearer sixty. He will not be soon forgotten. WARD WOOLNER

Dr. James Alfred Baker, of Gore Bay, Ont., died in June, 1936. He was born in 1875 and was a graduate of the University of Toronto (1898).

Dr. Edward Truman Boyes, of Hamilton, Ont., died on November 20, 1936, in his seventy-fourth year. He was a graduate of Trinity University (1890).

Dr. William John Chambers, a practising physician in Toronto since 1919, died suddenly recently, in his seventy-sixth year. He was born in St. Mary's and was educated in Brantford Collegiate Institute and Pickering College. He graduated in medicine from Trinity College, Toronto, in 1884, and the first six years of his practice were spent in Tiverton and Port Elgin.

News Items

Great Britain

Lord Nuffield's munificent offer of £1,250,000 for medical research at Oxford was announced in the *British Medical Journal* of October 24th. At a meeting of Congregation held on November 24th, and presided over by the Chancellor, Lord Halifax, a decree accepting with gratitude this latest and largest of Lord Nuffield's benefactions to the cause of medicine was proposed by the Vice-Chancellor, Mr. A. D. Lindsay, who quoted from Sir Farquhar Buzzard's Presidential Address to the British Medical Association last July, describing it as the immediate occasion of the offer. Speeches in support of the decree were made by Mr. W. M. Goodenough (who will act as chairman of the Board of Trustees), Sir Michael Sadler, Mr. G. R. Girdlestone, and Sir Farquhar Buzzard, Regius Professor of Medicine. Lord Nuffield, after thanking the speakers, said that he now understood, through his secretary, that the sum he had given was not enough to produce the effect he anticipated. He wished therefore to increase his donation to £2,000,000: "I would hate to leave this building with the feeling that that scheme was not complete". The Chancellor briefly expressed the gratitude of all present for the "princely munificence of a donor in thus completing a gift already unexampled in magnitude".

Sir John H. Parsons, F.R.S., the new President of the Royal Society of Medicine, has recently visited America as the guest of the American Academy of Ophthalmology and Oto-laryngology. His address on "Ophthalmology and Research" will be published in the *British Journal of Ophthalmology* in the new year. During his visit to New York the Lucien Howe medal of the American Ophthalmological Society was presented to Sir John Parsons in recognition of his services to ophthalmology. Previous recipients of the medal have been Carl Koller, Alexander Duane, Ernst Fuchs, Edward Jackson, Priestley Smith, Theodor Axenfeld, F. H. Verhoeff, and G. E. de Schweinitz.

The Nobel Prize for medicine and physiology for 1936 has been divided between Sir Henry Dale, M.D., F.R.S., director of the National Institute for Medical Research, London, and Professor Otto Loewi of Graz. The award is made for research work in connection with chemical transmission of nervous effects.

Prof. E. L. Kennaway, director of the Research Institute of the Royal Cancer Hospital, London, and Dr. J. W. Cook, research chemist at the institute, have been awarded the prize offered by the international Cancer Union for scientific work on cancer. The award was made at the second International Congress on Cancer, which was held in Brussels and was attended by representatives of 45 nations. The prize consists of about £350 and 50 milligrams of radium.

Alberta

The annual meeting of the Alberta Hospitals' Association was held at the Palliser Hotel, Calgary, on November 16 and 17, 1936, with Mr. A. Farmilo, the President, occupying the chair.

The delegates were welcomed by Mr. S. H. Adams, a former President of the Hospitals' Association. Dr. G. Harvey Agnew, of the Department of Hospital Services of the Canadian Medical Association, conducted a round-table conference, at which was included a discussion on "The moral and legal responsibilities of hospitals to care for infectious diseases". Dr. Agnew also gave an address on "Trends and development in the hospital field in the past year". Dr. Malcolm T. MacEachern, D.Sc., F.A.C.P., Director of Hospital Activities of the American College of Surgeons, Chicago, outlined what cooperative assistance could be established between larger hospitals of the urban centres and small rural hospitals. He made reference to what had been accomplished in Australia. Dr. MacEachern also gave an address on "Criteria for efficient hospital administration". Dr. R. T. Washburn discussed "The Edmonton hospital prepayment plan and its result to date". This has been in operation during the past two years, and Dr. Washburn characterized it as most successful. This plan differed from health or hospital insurance, in that all hospitals in a locality, entered into it. The problem of the indigent, the transient, the delinquent and the rural poor remain unsolved by this method. It was stated that this plan was one to help average working people to budget their accounts and pay their way. Dr. A. F. Anderson, of Edmonton, gave a paper on "The Canadian Hospital Council, its aims and objects, and how it affects hospitals, both large and small".

The Canadian Hospitals' Council was formed five years ago in Toronto and in subsequent period has proved its worth to every hospital association united with it. In one instance alone it had saved a large sum of money by having hospitals exempted from the Sales Tax by the Dominion Government. In 1935, when the Council met at Ottawa it became necessary for it to become a corporate body in order to own its own magazine. For this reason a new constitution was drawn up with microscopic changes which it was necessary for the affiliated units to adopt.

District Associations Numbers one and four have had their elections with the following results:

No. 1.—*Representative*, Dr. S. F. McEwen, Medicine Hat; *Vice-representative*, Dr. H. C. Dixon, Medicine Hat; *Members on Nominating Committee*, Dr. D. N. MacCharles, Medicine Hat; *Secretary-Treasurer*, Dr. A. E. Ward, Red Cliff.

No. 4.—*Representative*, Dr. J. J. Dobry, Killam; *Vice-representative*, Dr. M. E. Geissinger, Daysland; *Member on Nominating Committee*, Dr. J. R. Murray, Sedgewick; *Secretary-Treasurer*, Dr. F. W. Jones, Hughenden.

A system has been established in Edmonton, whereby people by paying so much per month get public ward hospitalization without further cost. It is hospital insurance at a definite rate.

Subscribers under the plan have a free choice of hospitals at all times, the only restrictions to membership are a thirty days' waiting period in lieu of medical examination, three months for elective operations, and nine months in the case of confinement. Single individuals cannot join; they must go in groups. The second year's operations have been satisfactory to both patients and hospitals. The money is kept in a separate fund, and the hospital accounts are paid as presented, at the agreed rate.

The Council of the College of Physicians and Surgeons met the Minister of Health on the question of some plan to render adequate medical attention to all persons on relief, which would be fair to the public and the patients as well as the physicians. The desire is for a uniform system throughout the province. The Council on behalf of the profession expressed willingness to accept a percentage of minimum fees, while giving a complete service to the patients who would have a choice of physician. The Minister agreed to gather data that might be helpful in estimating the cost of the experiment.

Some employers are still slow in reporting cases to the Workmen's Compensation Board, to the annoyance of all parties concerned, so the Board has decided that a continuance of this procedure will warrant action. If physicians are thus handicapped they should take the matter up with the Registrar. The Council met the

Chairman of the Workmen's Compensation Board and was assured the utmost cooperation in all matters of interest. The Board is endeavouring to put the human touch in all its dealings, and it remains to be seen if the workmen will appreciate this fact as time goes on. Several fresh contracts have been made by physicians, and unfortunately they are without clauses covering mileage. Thus, a physician's maximum helpfulness is impaired at the start, for answering unnecessary calls prevents prompt response where actually needed. The continued depression, together with the debt legislation, have multiplied the physician's grief.

A presentation was recently made to Dr. W. S. Galbraith, of Lethbridge, by the Council of the College of Physicians and Surgeons of Alberta, as a token of appreciation of twenty-one years' continuous service as member of the Council, from which office he recently retired.

G. E. LEARMONTH

British Columbia

The new Tuberculosis Clinic of the Provincial Government at the Vancouver General Hospital was opened on October 30th by the Lieutenant-Governor, Hon. E. W. Hamber. The Hon. G. M. Weir, Provincial Secretary, who made the opening address, paid a great tribute to Dr. W. H. Hatfield, Provincial Medical Director for Tuberculosis Control, in calling him the moving genius in the fight being waged in British Columbia against tuberculosis.

Dr. J. J. Gillis, Liberal member for Yale in the Provincial Legislature, stated that the Tuberculosis Clinic at the Vancouver General Hospital, according to reputable architects, cost $50,000 too much. The assertion was flatly denied by Hon. F. M. MacPherson, Minister of Public Works.

The British Columbia Hospitals' Association opened its nineteenth annual convention in Victoria on November 12th. At the opening session two resolutions were passed in connection with lower tariffs on imported hospital equipment. The newly appointed Director of Venereal Disease Control (euphemized in the *Vancouver Province* as a social disease), Dr. S. C. Peterson, stated that 15 per cent of those affected by blindness, 10 per cent of mental hospital admissions, and 18 per cent of those suffering from serious cardiovascular conditions were traceable to venereal infection. He outlined recommendations advanced recently for organization and staffing of clinics which should be used as teaching centres. Physicians should be encouraged to report cases drawn to their attention, and an extensive program of publicity would help with full cooperation of the public, the medical profession and the government. The delegates to the convention passed a resolution in answer to a bill from Dr. Allon Peebles, chairman of the Health Insurance Commission, pledging full cooperation to help make the health insurance act a success. J. H. McVety, of Vancouver, secretary and treasurer of the Hospitals Association, took exception to Dr. Peebles request, declaring that the support and cooperation of his body had already been given, but criticized the Commission for not cooperating more and for leaving the hospitals to the last before they were consulted regarding the operating of the Act.

Organization of the health insurance system in British Columbia will cost the provincial treasury $100,000 altogether, it was indicated, when supplementary estimates for the fiscal year 1936-37 were tabled in the Legislature by the Minister of Finance. The House voted $50,000 in March for setting up the new system, and the supplementaries call for another $50,000.

During the present session the provincial legislature will add silicosis to the list of injuries coming under the benefits of the Workmen's Compensation Act.

A recent statement of the Hon. G. M. Weir, Provincial Secretary, to the effect that one in five British Columbians suffered with or from the effects of venereal disease has been attacked and contradicted in various quarters. Dr. Weir, who states that he got his opinion from Dr. A. D. Crease, of Essondale, appears to consider that his statement does not justify the strictures commonly placed upon his claim that 20 per cent of the population have venereal disease. There appears to be a wide variety of opinions on the subject, none of them appearing to emanate from reliable sources of information. One physician stated publicly that there are not more than 15,000 cases in the province, and another stated that in his own constituency, a rural one, not one in a hundred is affected with such a disease.

Compulsory medical examination of all restaurant employees, to be repeated semi-annually, and a prohibition of all drug store lunch-counters are among the provisions in a new restaurant by-law to be put before the civic health committee of Vancouver. Selling meals in tents and other temporary locations, in houses, or in the office space of business blocks, with the exception of the top floor, are also to be forbidden.

At a meeting of the North Pacific Surgical Association, held in Tacoma on November 20th, Dr. Frederic Brodie, of Vancouver, was elected to the presidency, and Dr. Lee Smith, also of Vancouver, to membership.

D. E. H. CLEVELAND

Manitoba

Dr. F. W. Jackson, Deputy Minister of Health, reported to a meeting of the Provincial Board of Health held on December 4th that the convalescent serum prepared by Dr. F. T. Cadham, Provincial Bacteriologist, was of the greatest assistance in keeping down the number of cases of infantile paralysis in the recent epidemic, and that it was equally effective in reducing the number of cases of residual paralysis. From the first case reported on June 18th up to December 4th 494 cases were reported to the Department of Health, 84 from Winnipeg and 410 from outside. It is possible that there were 30 or 40 additional cases. The number of deaths will probably reach 30 and the cases of residual paralysis 75. This compares favourably with the 1928 epidemic when with 434 cases there were 49 deaths and more than 150 cases of residual paralysis.

At a meeting of the Honorary Attending Staff of the Winnipeg General Hospital held December 8th the following officers were elected: *Chairman*, Dr. J. D. McQueen; *Vice-chairman*, Dr. O. S. Waugh; *Secretary*, Dr. J. M. McEachern. Dr. C. W. Burns was elected a member of the Advisory Committee and Dr. O. S. Waugh a member of the Training School Committee.

At the recent annual meeting of the Union of Manitoba Municipalities held in Winnipeg a resolution brought in favouring birth-control and suggesting that information be given by doctors and nurses in unorganized districts was voted down.

ROSS MITCHELL

New Brunswick

Hon. W. F. Roberts, Minister of Health for New Brunswick, arranged for a refresher course for public health nurses in the province, which was held in Saint John on November 12th, 13th and 14th, under the auspices of the Department of Health. The various public health nurses with visitors from the state of

Maine and other nurses interested in public health matters were addressed by a number of experts on various subjects of interest. Dr. D. F. W. Porter spoke on "Preventive pædiatrics and common abnormal conditions", and also on "Diet in infancy". Mrs. W. T. B. Mitchell, B.A., R.N., Educational Director of the Mental Hygiene Institute of Montreal, lectured on the "Fundamental principles of mental hygiene which the nurse must understand". Her second subject was "Parent education". Nutritional subjects were discussed by Miss Helen Wetmore, head of the Dietary Department of the Saint John General Hospital. Dr. R. J. Collins presented two addresses, "New concepts in the control of tuberculosis in childhood", and "The problem of tuberculosis in the public health nurses' program".

Lieut. R. A. Hughes, C.A.M.C., recently made a trip to Boston on Armistice Day for the purpose of presenting the Canadian flag to number one post of the British War Veterans in that city.

Dr. L. M. Curren, who has for some time been the medical officer at the Workmen's Compensation Board, New Brunswick, has been appointed vice-chairman of that Board.

Dr. G. C. Legere, Buctouche, N.B., is at present in Toronto studying for the diploma of Public Health.

The Executive Committee for the New Brunswick Medical Society met in Fredericton on December 4th, and in addition to regular business of the Society devoted a large amount of their time to the discussion of federation within the Canadian Medical Association.

A. S. KIRKLAND

Nova Scotia

A meeting to discuss the recently published survey on tuberculosis in Glace Bay was held in that town on December 3rd. The meeting was called by the Tuberculosis Committee of the local branch of the Canadian Legion. Delegates from several societies, as well as directors of the two local hospitals, were present. Hon. Dr. F. R. Davis, Minister of Health, addressed the meeting. He stated that the Government of Nova Scotia was willing to equip two thirty-room annexes to the Glace Bay Hospitals, and to pay one dollar per day towards the expenses of tuberculous patients. This sum represents two-thirds of the total cost per patient per day. The Minister further referred to the establishment of a public health unit in Cape Breton, whereby patients could have expert treatment. A specialist in tuberculosis control would be put in charge.

On November 12th the western branch of the Nova Scotia Medical Society gave a banquet in honour of two Yarmouth County physicians who have practised there for fifty years. They were Dr. Charles Ashton Webster and Dr. G. W. T. Farish. Each one represents the third generation of medical practitioners in that County. Dr. Henry Farish was the first to settle there. He practised for fifty-four years; his son, Gregg Joseph Farish, succeeded him and practised for forty-five years. His second son, James, practised for fifty years, while Henry Gregg Farish, father of G. W. T. Farish practised at Liverpool for sixty years.

Dr. Charles Webster is a descendent of Dr. Isaac Webster, first of his name to practise in Yarmouth. His son Frederick was the next doctor. He was succeeded by Dr. G. L. R. Webster, who was the father of the present Dr. Webster. Dr. J. Corston, of Halifax, President of the Nova Scotia Medical Society was present.

Dr. W. D. Forrest is one of a committee of three appointed by the Provincial Government to make a thorough investigation into the operation of the Workmen's Compensation Act. Some sittings have been held. It is proposed to hold meetings throughout the province to investigate complaints. Several practitioners have already appeared before the committee to state their views.

A fire that broke out in the coal room of the Digby General Hospital was soon put under control, but work was carried out all night moving the smouldering coal. The damage to the building was slight, only some of the woodwork being scorched.

A meeting of rateprayers of Kentville, on November 16th, passed a resolution favouring the erection of a hospital in the town. Approval was given to transfer a plot of ground in the Memorial Park to the Hospital Commission as a site for the proposed hospital.

Several doctors suffered severe losses in a bad fire which occurred at Sydney Mines. The victims are Drs. W. Archibald, W. T. McKeogh, and Hugh Martin, whose surgeries were gutted.

Dr. Starr Ford, Professor of Medicine at Cincinnati Medical College died during the month, at the age of 71. He had practised in Cincinnati for forty years. He was born in Nova Scotia and was a graduate of Acadia University.

Dr. Audley A. Griffin, who graduated from Dalhousie in 1931, has started practice in Bridgetown.

At a monthly of the Victorian Order of Nurses at Kentville, the recommendations of a Committee urging the establishment of a central milk distributing plant, to provide milk secured only from herds certified free of tuberculosis were adopted.

N. B. DREYER

Ontario

The George Armstrong Peters Prize in post-graduate surgery has been awarded to Dr. M. C. Watson, of the staff of St. Michael's Hospital, Toronto, and was presented to him by the President of the University of Toronto at the December meeting of the Council of the Medical Faculty.

The J. A. Faulkner Medal in Psychiatry has been awarded to Dr. G. E. Hobbs, of Toronto.

J. H. ELLIOTT

Saskatchewan

Dr. R. G. Ferguson in his presidential address at the eighteenth annual meeting of the Saskatchewan Hospital Association stated that financing of hospitals is the major problem of the day. Compelled by their origin in Christian charity to care for all, whether able to pay or not, to carry bad risks without insurance, without any preferred place among creditors, hospitals were unique among present-day institutions.

Dr. B. C. Leech, director of anæsthesia in the Regina General Hospital, in his paper on "Anæsthesia" urged the value of having special departments of highly trained and expert anæsthetists in all hospitals where possible. He pointed first to the relative unimportance attached to anæsthesia in the early days of surgical practice, to the "sledge-hammer" type of giving chloroform. Today the picture had changed. The patient was not forced to battle with two or three husky attendants but was given the most expert treatment designed to meet his case and temperament. Larger hospitals should take the lead in providing special departments of anæsthesia, with directors devoted to that work, in training staffs and supervising generally. For smaller hospitals he felt that one doctor in the com-

munity should be asked to supervise the anæsthesia, and work toward improving the service.

S. R. Curtin, K.C., of Regina, outlined the legal question. He gave his opinion that the surgeon was primarily responsible to the patient, and that the anæsthetist, during an operation was, in effect, the surgeon's servant or agent. If a mistake was made it was the surgeon's responsibility and not the hospital's. But it was advisable for hospitals to inform surgeons of the qualifications of their anæsthetists so that they might be in full possession of all the facts before undertaking the responsibility of operating.

Dr. R. O. Davison, of Regina, deputy minister of public health spoke on "The operation of Saskatchewan hospitals in 1935".

Other papers given were: "Trends and developments in the hospital field", by Dr. G. H. Agnew; "The hospital administrator", by Dr. M. T. MacEachern; "Food service without a dietitian", by Miss O. J. Argue, with discussion by Mrs. E. B. Rutter. The report of the Canadian Dietetic Association was given by Miss E. Porter. A report of the tuberculosis work in the province was given by Dr. R. G. Ferguson. A report on "State hospitalization" was given by Mr. Leonard Shaw.

Other papers read were: "The new curriculum for schools of nursing", by Miss Ruby Simpson; "Nursing advisor for the training schools", by Miss Edith Amas; "The board's duties to the hospital", by Moose Jaw General Hospital Board; "Laundry operation", by Dr. H. H. Mitchell.

Drs. H. C. George, F. A. Corbett and C. M. Henry gave a report to the Regina and District Medical Society on the information received at the Tumour Clinic in Chicago, with Cutler, Coutard and Cheatle. Dr. Henry gave a paper summarizing the treatment of cancer of the breast in the Regina Cancer Clinic.

The incidence of tuberculosis in Saskatchewan for 1935 was the lowest of any province in Canada. On the basis of 100,000 of population Saskatchewan's death rate was nearly 8.5 deaths below its nearest competitor, Ontario and was 32.5 below the average for the whole of Canada.

The following table of comparisons for all provinces is based on the number of deaths per 100,000 population. All Canada 60.3; Nova Scotia 92.4; Quebec 91.9; New Brunswick 77.4; British Columbia 76.9; Prince Edward Island 67.4; Manitoba 58.3; Alberta 42.2; Ontario 36.2; Saskatchewan 27.8.

LILLIAN A. CHASE

United States

The American Association for the Study of Goitre again offers the Van Meter Prize Award of $300.00 and two honourable mentions for the best essays submitted concerning experimental and clinical investigations relative to the thyroid gland. This award will be made at the discretion of the Society at its next annual meeting to be held in Detroit, Michigan, June 14th, 15th, and 16th.

The competing manuscripts, which should not exceed 3,000 words in length, must be presented in English and a typewritten double-spaced copy sent to the Corresponding Secretary, Dr. W. Blair Mosser, 133 Biddle Street, Kane, Pennsylvania, not later than April 1, 1937. Manuscripts received after this date will be held for competition the following year or returned at the author's request.

At the last annual meeting of the Society, the Award for the year 1936 was presented to Dr. Eduard Uhlenhuth, University of Maryland Medical School, Baltimore, in appreciation of his manuscript entitled "Isolation of the thyreoactivator hormone from the anterior lobe of the bovine pituitary gland". The Committee also awarded honourable mention to Dr. E. Cowles Andrus and Dr. Donald McEachern, Johns Hopkins University and Hospital, Baltimore, for their manuscript entitled "On the nature of the increased metabolism in hyperthyroidism".

The Association will publish the manuscript receiving the Prize Award in their annual Proceedings, and reserve a place on the program of the annual meeting for presentation of the manuscript by the author, if it is possible for him to attend. This will not prevent its publication, however, in any journal selected by the author.

Book Reviews

Syphilis and its Treatment. William A. Hinton, M.D., Boston. 321 pages. Price $3.50. Macmillan Co., New York and Toronto, 1936.

Limiting himself to present day accepted knowledge of the diagnosis and management of syphilis, the author has succeeded in presenting a comprehensive and concise book which can be strongly recommended for student and physician. Illustrations, controversial issues, speculative fields, and such details as technique of treatment, etc., have been purposely omitted. One-third of the book is devoted to the treatment of syphilis in its various phases and relations. An attempt has constantly been made to correlate the interpretation of laboratory tests and the clinical aspect of the cases with suitable treatment. A very condensed appendix of twelve pages on the technique of laboratory tests for syphilis concludes the book.

The Thyroid. E. P. Sloan, M.D. 475 pages; illustrated. Price $10.00. C. C. Thomas, Springfield and Baltimore, 1936.

This is a compact treatise on the thyroid gland in all its phases, published after the lamented death of its author. In it the late Dr. Sloan has presented a very difficult subject in a very simple manner, equally as valuable to the students and general practitioner as to the thyroid surgeon. His subject-matter generally is well up-to-date and is excellently arranged.

In the opening chapter on Anatomy and Physiology, he introduces a new term "Thyrom", possibly inadvisedly, to designate an unknown substance which he believes to be the active principle contained in the thyroxin molecules, differentiating thyroxin from iodine. The two chapters on Etiology and Prophylaxis are short, very concise, and well presented.

Dr. Sloan's exposition of follicular development cannot be accepted as it is now a well-known fact that in many cases th ethyroid is completely developed at full term.

In the chapter on Thyroid Pathology Dr. Sloan has threaded his way through the difficult and gradual development of the different phases of the subject and has presented us with a new classification of goitre which is well worthy of note. It is of interest to note that he has failed to describe, or even mention, lymphadenoid goitre.

Symptomatology, diagnosis, prognosis, indication, and contraindication for operation are well covered in special chapters. Dr. Sloan has presented the surgical anatomy especially well, possibly a little more extensively than is usual outside of textbooks of Anatomy. The fascial planes of the neck were the author's chief hobby and delight so that he can be excused for his lengthy discourse on this subject. His operative technique forms an admirable basis for study to those developing a technique of their own, but he has been inclined to make

rather a tremendous business of it. He favours leaving the posterior branch of the superior thyroid artery intact to insure nourishment to the gland left behind. This is not generally done.

In his post-operative treatment cold tub-baths for post-operative thyroid toxicosis is possibly rather a heroic measure. Ice packs are preferable. He fails to emphasize the use of Lugol's solution for a definite period of time following thyroidectomy, a medication all too frequently forgotten, or discontinued too early. The latter part of his book is devoted to a short summary on Hypothyroidism, the Parathyroid Glands, and the Thymus.

This book is a fitting climax to a life-term interest in the thyroid gland.

Gynæcology and Obstetrics. Edwin M. Jameson, M.D., Surgeon, General Hospital, Saranac Lake, N.Y. Clio Medica Series, No. 17. 170 pages. Price $2.00. Paul B. Hoeber, New York, 1936.

Written, as the author says in his preface, "more as a story than to add to our existing knowledge", the book commences with the Early Period, comprising all available references to these specialities amongst the Hindus, the American Indians, the Hebrews, and the Egyptians, although the recently rediscovered Smith Medical Papyrus, believed to be the oldest of extant Egyptian papyri, is not mentioned. The Greek and Roman Period is dealt with largely by reference to the writings of Hippocrates and Soranus respectively. The Arabians receive but scant credit for their service of transmitting, if not adding to, medical lore; nor is the importance of the adoption of the scientific attitude in the Renaissance sufficiently stressed, despite the lack of immediate improvement effected, for this is to be judged, as he quotes Mr. H. G. Wells regarding the Greeks, "not in the results achieved but in the attempts made", and the foundations laid for sound future progress. Finally, Chapter IV traces the Modern Period of the last two centuries under such names as Smellie, Hunter, Mauriceau, and Simpson. Little is said, however, of the development of knowledge of the mechanism of labour, or of manœuvres to aid it. Separate chapters trace the exceedingly curious history of the Chamberlen family and the forceps; the dramatic story of Semmelweiss and puerperal fever; and finally the development of gynæcological surgery, in which McDowell and ovariotomy, and Sims and the relief of vesico-vaginal fistula, occupy prominent parts. The pleasure of the book is much enhanced by liberal indexing of subjects and personal names separately, and the appending not only of a bibliography, but also of a list of "Gynæcological and Obstetrical Classics". No attempt is made to outline the present status of either achievements or problems, or the possible course of future developments. Although necessarily very sketchy, and with the emphasis sometimes in directions other than the reviewer's, the book is a fairly comprehensive and very readable story of one of the most interesting phases of medical history.

Interpretation of Laboratory Findings. Raymond H. Goodale, M.D., Pathologist, City Hospital, Worcester, Mass., 170 pages. Price $2.25. F. A. Davis Co., Philadelphia, 1936.

This book is neither a textbook of clinical diagnosis nor a manual of laboratory technique. It is rather an effort to put in very compact form the diagnostic significance of the various findings commonly reported from the laboratory and the diseases in which such findings might be expected to occur.

It is divided into four parts. In part one the examinations carried out in the fields of hæmatology, blood chemistry, serology, urinalysis, etc., are enumerated, their normal values given, and the diseases listed in which departures from the values met with in health occur. In the second part the method of approach is reversed, by giving the typical laboratory findings in various diseases. In part three there is a brief and extremely elementary discussion of how and why these abnormalities arise. Finally, there is a chapter of instructions concerning the proper taking and preserving of the material to be brought to the laboratory.

Such a concise collection of information would seem to be of value first to those physicians who graduated before many of the modern laboratory methods were devised and have not been in a position to keep in touch with their development, and, secondly, to students who are learning the subject.

Physician, Pastor and Patient: Problems in Pastoral Medicine. George W. Jacoby, M.D. 390 pages; illustrated. Price, $3.50. Paul B. Hoeber, New York and London, 1936.

The author of this most helpful work is the well-known neurologist and psychiatrist; anything that comes from his pen deserves careful consideration. The struggle for life, in other words for subsistence, is the mainspring of all progress and all culture; but while it develops human capabilities it also produces physical and mental disorders; it causes crimes, revolutions, war and other evils. "To dispel these is the duty of civilization, particularly as represented by Medicine, Pedagogy, Jurisprudence and Religion." Dr. Jacoby has already written on this topic. His book, "Child Training as an Exact Science" deals with the relationship between the physician and the teacher; his "The Unsound Mind and the Law" endeavours to do a similar service to the physician and jurist. Now he completes the trilogy, seeking in "Physician, Pastor and Patient" to present impartially the relations existing between Medicine and Religion, to indicate where these two spheres merge, and to show how further cooperation between the physician and the clergyman can be brought about. Throughout the book we find evidence of Dr. Jacoby's wide experience, his philosophic mind, and his broad outlook.

The ground covered in this book is so extensive that it is impossible in a short review to do more than mention the chief topics dealt with. The brief introduction, entitled "Where Religion and Medicine Join Hands", is particularly valuable and sets the key-note for the rest of the work. Part I deals with The Physician's Calling; Part II with Religion and the Patient; Part III with Vital Problems confronting the Physician and Clergyman (contraception, abortion, suicide, divorce, criminality, sterilization, sex and sex-education, mental abnormalities, euthanasia, vivisection, and professional secrecy); Part IV, Where Medicine and Religion join Hands in Everyday Life. There are excellent sections on superstition, health matters as dealt with under Judaism, the Oriental religions, Mohammedanism, and Christianity, and the practical measures now in vogue for the mental, physical, moral and religious betterment of mankind are indicated at the close of the volume. Altogether this is a book for the thinker, no matter to what class he belongs. There is not a dull page in it.

British Masters of Medicine. Edited by Sir D'Arcy Power, K.B.E., F.R.C.S., F.S.A., Consulting Surgeon and Archivist to St. Bartholomew's Hospital; 242 pp.; illustrated. Price $2.25. The Medical Press and Circular, London, 1936.

If a number of persons were each asked to furnish a list of "The Hundred Best Books" no doubt no two of their productions would be identical. This would be due to individual differences in the standards of comparison and in personal taste, perhaps both. Similarly, opinions will differ as to who should be admitted to the galaxy of "Masters in Medicine". Mr. D. McCrae Aitken, F.R.C.S., in his essay on Hugh Owen Thomas which appears in this book lays down this principle,—"A place among British Masters of

Medicine is only to be accorded to those whose life and work has contributed something entirely new to our knowledge, such as Jenner's discovery that cow-pox affords an immunity from small-pox, or to those who give a new interpretation to the meaning of diseases or disorders of the human body, as was done by Sir James Mackenzie, who, from his personal observation of cases met in a busy general practice in Burnley, evolved new interpretations of the meaning of 'heart disease', and put the treatment of cardiac disorders on a completely new footing.'' Judged by these criteria it is arguable whether certain of the personalities considered in this volume are justly included. One or two of them are certainly not widely known. This is not necessarily a fact to be cited against them, and we do not mean to be captious. We, of British stock, have reason to be proud of the many members of our profession who have found a place among the immortals. They are not all considered in this book, but, no doubt, it was not the intention of the editor to produce an all-comprehensive work. We are told in the preface that the articles appeared originally as a series in the pages of *The Medical Press and Circular* under the title of ''British Masters of Medicine'', and were published during the years 1934 and 1935. ''They are of such excellence that it seemed a pity to allow them to sink into the oblivion which is the inevitable fate of all contributions to periodical literature''. Hence, this book. The ''Masters'' dealt with are Harvey, Sydenham, Floyer, Cheselden, Pott, John Hunter, Lettsom, Jenner, Willan, Bright, Addison, Stokes, Fergusson, Todd, Simpson, Paget, Lister, Turner, Thomas, Jones, Manson, Osler, Sir James Mackenzie, and Starling. The essays are written by those who have been attached to the great institutions which their heroes have made famous and appear in chronological order. The editor points out that the contributions incidentally, to some extent, give an account of the progress of medicine and science from Harvey to Starling. The essays cover the ground adequately and yet are commendably short. All medical men would be the better for reading this book, which is as excellent as it is inexpensive. It is a revealing story and an inspiration.

Microbiology and Pathology for Nurses. Charles F. Carter, B.S., M.D., Director, Carter's Clinical Laboratory, Dallas, Texas. 682 pages, illustrated. Price $3.50. C. V. Mosby, St. Louis; McAinsh & Co., Toronto, 1936.

The first portion of this book is an outgrowth of ''Bacteriology for Nurses'' written by the author in 1928. This has been completely rewritten, enlarged and brought up to date. This portion has been written with its use as a nursing textbook in mind, special emphasis being laid upon those aspects of bacterial study, dissemination and control, of value to the nurse. The second portion of the book, dealing with pathology, is entirely new. On the whole it would appear that the first portion of the book, which is very well prepared, is better than the section on pathology. The latter, however, and particularly the chapter dealing with the pathology of the female organs, does seem to cover those pathological features of most interest to the nurse. The book is well illustrated, references are easy, and an extensive glossary is appended.

An Introduction to Materia Medica and Pharmacology. Hugh A. McGuigan, Ph.D., M.D., Professor of Materia Medica, Pharmacology and Therapeutics, University of Illinois, Chicago, and Edith P. Brodie, A.B., R.N. 580 pages, illustrated. Price $3.00. C. V. Mosby Co., St. Louis; McAinsh & Co., Toronto, 1936.

This is a new book developed from Brodie's ''Materia Medica for Nurses'' which went through four editions. In preparing this larger volume the 1936 edition of the U.S.P. and the National Formulary were followed, thus bringing the text up to date. Much new pharmacological and clinical data have been added. Considerable use is made of diagrams and other illustrations, many in colour, to demonstrate physiological actions, clinical and laboratory procedures, medicinal plants, etc. The book is well written and exceedingly practical from the teaching standpoint. The setup is particularly good for easy reading. If anything, the volume is too complete for the limited study periods of the student nurse, being almost adequate for the medical student; however, reading is simplified by the division of the volume into Elementary Materia Medica and Advanced Materia Medica and Therapeutic Application. From the viewpoint of instruction in Canadian Schools of Nursing, the student would be handicapped by the lack of reference in the volume to B.P. or Canadian Formulary preparations and dosages—essential in this country.

Maternity and Post-Operative Exercises. Margaret Morris, C.S.M.M.G. and M. Randell, S.R.N., S.C.M., T.M.M.G. 152 pages, illustrated. Price $2.25. Wm. Heinemann, London; Macmillan, Toronto, 1936.

This book contains twenty or more exercises suitable for use in the ante-natal and post-natal periods and also in post-operative conditions. These exercises were designed by Miss Morris in conjunction with Miss Randall, of St. Thomas' Hospital, London, and are intended primarily for masseuses and nurses who have taken a special diploma in remedial training.

The value of post-partum exercises to promote circulation and restore muscular function which has been weakened by labour is generally accepted, and leads to a more complete recovery of the patient. During labour the value of exercise seems more questionable. The scheme of exercises drawn up is well balanced and rational for both post-partum and post-operative cases, but it would require the services of a specially trained masseuse to carry out the work satisfactorily.

Tissue Immunity. R. L. Kahn, M.S., D.Sc., University of Michigan, Ann Arbor. Price $7.50. C. C. Thomas, Springfield and Baltimore, 1936.

Dr. Kahn here presents the results of his studies in tissue immunity as carried out over a number of years. As he points out, there is a wide gap between the laboratory work on tissue immunity and its practical application. The current view of allergy is that it is a hypersensitive condition of the tissues, but Dr. Kahn would stress the alternative view that it is a defensive position, not entirely hypersensitive. The book will be of interest especially to those in laboratories.

Physical Therapy for Nurses. R. Kovacs, M.D., Clinical Professor and Director of Physical Therapy, Polyclinic Medical School and Hospital, New York. 286 pages, illustrated. Price $2.75. Lea and Febiger, Philadelphia, 1936.

This excellent little volume contains a surprising wealth of information. It does not presume that the reader has full knowledge of radiant energy, electricity, and other underlying physical forces, but gives a clear and concise review of the fundamental principles involved. All phases of physical therapy are reviewed, including heat, light, electricity, water, massage and exercise, this last section being contributed by Madge C. L. McGuinness, M.D., Chief of the Department of Physical Therapy in Vanderbilt Clinic. Short-wave and ultra-short-wave diathermy and other new forms of physical therapy are discussed. The book is essentially practical, emphasis being laid upon the technique of treatment. It is fairly conservative in tone. It has been written especially for nurses and can be so recommended, but it is a volume which would yield much valuable information to any medical reader.